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INDEX NUMBER

The Laundry Trade: I. A Study in Activity and Fatigue

Blastomycosis as a Complication of Industrial Accidents

On Cancer-Producing Tars and Tar-Fractions

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THE LAUNDRY TRADE: I. A STUDY IN ACTIVITY AND FATIGUE*

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INTRODUCTION

THE laundry trade holds a unique position in the industrial world. It is at one and the same time a luxury and a necessity; dirty clothes must be washed in the interests of both health and comfort, but who shall wash them is determined mainly by the income of the household concerned. There is a popular supposition to the effect that anyone who will, can wash clothes; hence, whenever there is need for economy, the laundry is dispensed with. Of no other trade of the size of the laundry trade can it be said with as much truth that its competitors are its own customers. Again, the laundry as we now understand it is of comparatively recent development, and it is possible to see every stage of its development from the old woman who took in a "bit of washing" to the high class factory worked on scientific lines.

It is essentially an individualistic trade, governed by methods more characteristic of the past than of the present; the owner usually works in, or is intimately connected with, the laundry and knows his work-people well. Since the number of employees in any given factory is relatively small, a much more personal note can find expression than is possible in the large undertakings so characteristic of the present time. A laundry may employ few people or many; some employ about 400, but the latter are not so characteristic of the trade as a whole.

The keynote of the trade is variability. There is no standard for anything except the minimum requirements to satisfy the factory inspectors. The building may be a model factory with the latest equipment; it may be, and more probably is, a converted shop, house or stable. Proprietors and managers represent every social class and type of education and ability; the workers range from the old washerwoman of the previous generation to the latest type

*Received for publication Nov. 16, 1923.

of the modern factory girl. The standard of work varies from town to town as well as from laundry to laundry, while it is obvious that the articles to be washed vary from week to week.

The difficulties confronting any investigation into fatigue in an industry of this type are very great. Earlier fatigue investigations undertaken during the war were concerned for the most part with fairly large numbers of people doing repetitive work; under these circumstances it was possible to acquire mass data of statistical value. Under present conditions in a trade such as the laundry trade mass data cannot be obtained. In some processes there is only one worker in a given factory; in none are there many. Hence, any study must depend upon data obtained from a few individual workers. The problem, then, is how far can a few workers be taken as typical. It is possible for anyone to maintain that no one person is typical, that the selected worker is an exception. Against this there is the opinion of the firm and the observation of the investigator. For any given process a certain standard of qualification is required; a worker who failed to reach the desired standard would not long remain in the position; a worker who was exceptionally good would certainly be noted. For these reasons what is true of any one individual in regard to such general questions as the length of the working day, rest pauses, etc., will probably be true of most workers on similar processes and under similar conditions. When several studies made in different laundries show similar results, and when these results are in harmony with similar studies of workers in other trades, the probability that each person is an exception is considerably reduced. These points must be borne in mind when records are given of trades not engaged strictly on repetitive work. The argument is not that from one or two cases a general principle can be drawn—this would certainly involve the logical fallacy of arguing from insufficient data—but that under certain conditions there is good reason to believe that one worker is typical of many and, therefore, that what is true of that one worker is probably true of many.

A laundry usually consists of the following departments:

1. *The wash-house* where the actual washing and starching of the clothes are done. Wash-house work involves heavy muscular effort and is usually done by men.

2. *The calender room,* where flatwork, such as sheets and table linen, is passed over steam-heated rollers, by which process it is dried and ironed. The work is always done by women and is fairly heavy.

3. *The collar department,* where collars are steamed, polished, molded and curled, special machines being used for each process. The process is always done by women and is quite light.

4. *The ironing department,* where articles are either ironed entirely by hand or finished off by hand, such parts as can be so treated—*e.g.,* the soft part of shirts—having been done either on a press or on a "body ironing" machine. This work is invariably done by women and is fairly heavy.

5. *The sorting and packing department,* where goods entering the laundry are sorted, checked and marked, and finally, after passing through the laundry, are packed to be sent home to the customer. This is, on the whole, the most responsible department, and the work involves constant attention on the part of each worker, as well as speed.

From the point of view of an inves-

tigation as to the factors affecting the work curve, certain departments had to be omitted entirely, as it was impossible to get any satisfactory measure of the work done, owing to the bewildering array of variables. This applied particularly to the washing department and to the packing.

General Health Conditions

No occupation open to women, of the class which cannot be described specifically as dangerous, is so frequently stigmatized as unhealthful in the public press and in ordinary conversation as is the laundry trade. The average speaker using the word "laundry" conjures up the image of a cellar or a kitchen where some domestic washing is in process. That there are buildings where for nine hours a day washing and ironing are conducted without causing either steam or gas to escape into the atmosphere is unrecognized by many. Certainly there are totally inadequate buildings from which steam cannot readily escape, but a whole trade cannot be condemned for the faults of a few.

The united efforts of the factory inspectors and the more enlightened proprietors and managers have resulted of recent years in such a marked improvement that to say that a building is a laundry now signifies only the kind of work done there; the conditions for that work may be ideal or indifferent.

During the present investigation the writer was often told by various members of the community, including doctors, that the laundry trade was unhealthful and that large numbers of the workers suffered from varicose veins. In order to verify or disprove this statement an attempt was made to collect health records. To obtain definite evidence, however, proved much more difficult than was anticipated. Laundry work is essentially a married woman's occupation; hence, much that is vaguely termed sickness is due to natural causes. The insurance records proved inadequate owing to the absence of differentiation of laundry workers. In order to obtain some information on the subject, with the co-operation of the secretary of the Launderers' Federation, members were asked to fill out, at regular intervals, forms giving details of the time lost by their workers, and to state the alleged reason. A large number of replies were received, but not all could be used for statistical purposes as the length of time during which they were filled out varied. Some firms wearied of well-doing too soon, and in several cases replies were received to the effect that it was not worth while to keep records as hardly anyone stayed away! It was possible, however, to deal with twenty-three firms that sent records for at least three winter and three summer months. The records relate to 1,144 women, of whom 274 were married. Table 1 gives a summary of the data. Although these figures can be taken only as a rough sample of the whole, yet it seems reasonable to suppose that they are fairly representative, as the firms from which they were received represent most types of laundry buildings and are situated in widely separated parts of the country. The records of other firms, extending over a

TABLE 1.—TIME LOST (PERCENTAGE OF TOTAL POSSIBLE HOURS) THROUGH ILLNESS AND OTHER CAUSES

Class of Worker	Winter		Summer	
	Illness	Other Causes	Illness	Other Causes
Married women	1.2	0.9	1.5	1.0
Single women				
Over 16	1.8	0.4	1.4	1.3
Under 16	1.5	0.2	1.0	0.3

shorter period of time, are in no way contradictory, but are of exactly the same type.

Given good conditions, there is no reason whatever to look upon the trade as detrimental to the health of the worker.

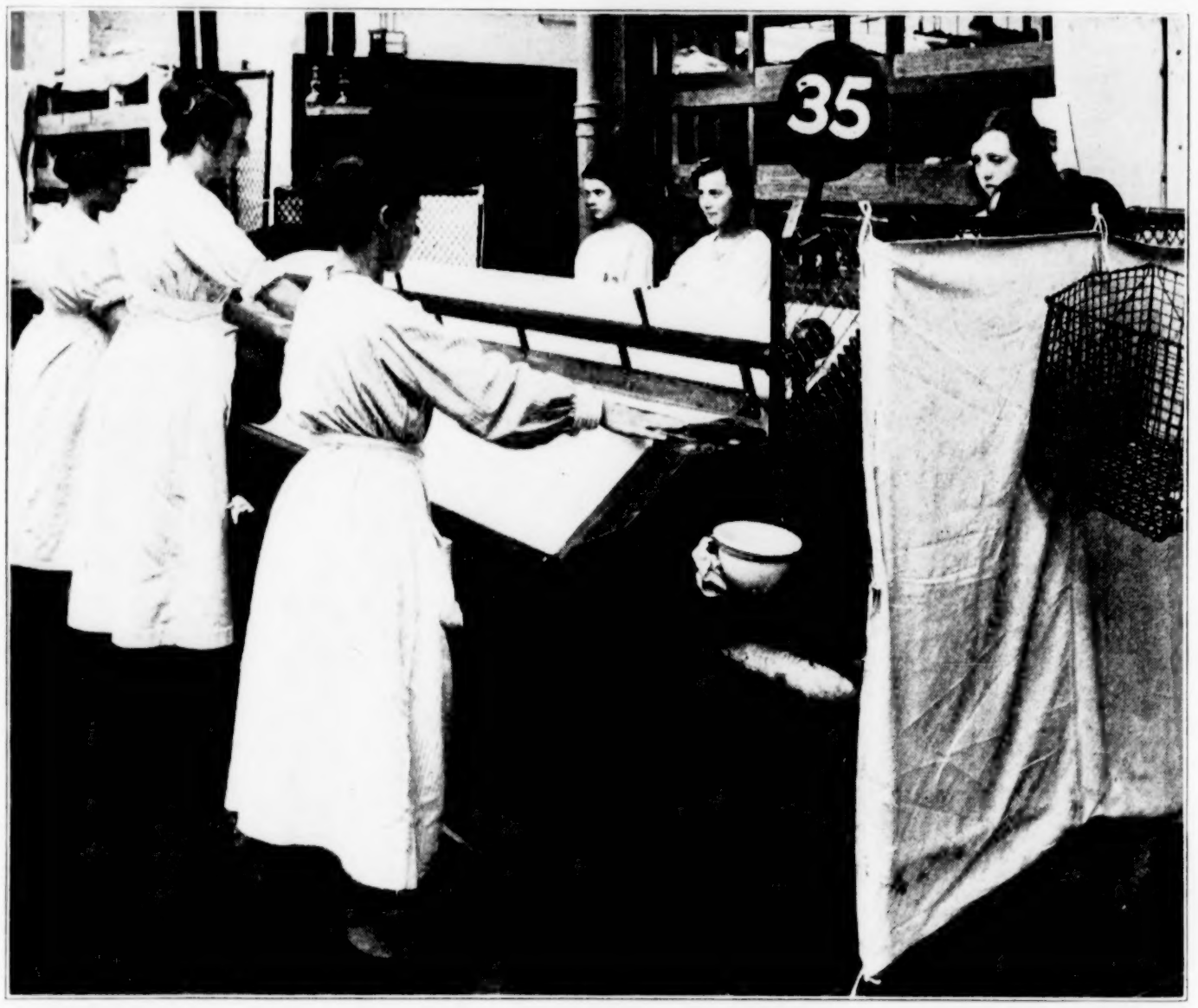

FIG. 1.—A calender with treadle action.

FACTORS AFFECTING THE WORK CURVE

Calender Work

Two forms of calenders were used in these records (see Figs. 1 and 2). Figure 1 represents a calender with a treadle action, the foot being used to start the operation; Figure 2, a calender with a "ribbon feed" and no treadle action. From the point of view of the workers the "ribbon feed" type is less fatiguing.

For the purpose of this investigation it was found most convenient to limit the records to sheets and table linen of a uniform size. To take total output proved impracticable. As a measure of efficiency, the interval elapsing between the time when the two "feeders" took their hands off one article and placed the next was measured. The details of the method adopted were as follows:

1. Enough sheets were "prepared" to permit calender feeding to be conducted without stops.
2. As soon as the workers took their hands off the end of one sheet, the stop watch was started.
3. As soon as they had placed the next article, the watch was stopped and the time in seconds noted.
4. Twenty such intervals were taken in immediate succession.
5. The average of these intervals was obtained and was taken to represent the worker's capacity at that time.

These intervals are entirely under the worker's own control and it seemed

probable that if any fatigue were present they would get longer owing to a slowing down of muscular activity. The difference in the interval at different periods of the day is shown in the following examples. For the purpose of simplification only ten intervals are given.

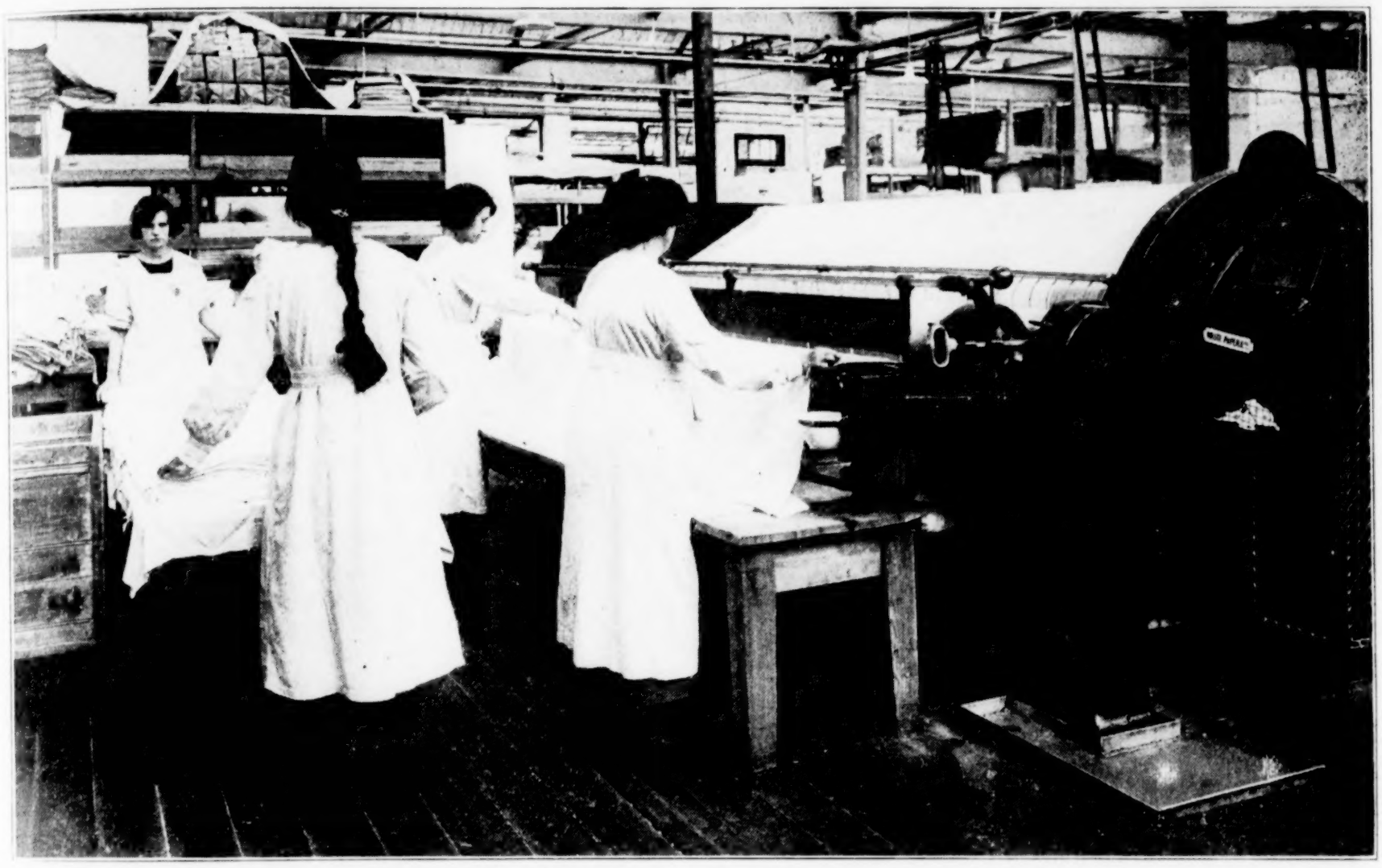

FIG. 2.—A calender with "ribbon feed."

Time of Day	Interval in Seconds										Average Interval
9 A. M.	6	6	9	7	7	6	5	8	8	8	7.0
6 P. M.	10	11	12	10	9	10	10	11	9	10	10.2
7.30 P. M.	12	15	12	13	25	19	16	17	19	20	16.8

This particular series applies to but one day and hence is of value only as an illustration, but it is typical of many such records. The workers themselves were not conscious of the difference.

With one firm it was possible to get a comparison of these intervals during a fortnight when they were working ten hours a day and another fortnight when working the usual nine hours a day. The workers in all these records were engaged on the same class of work and on the same machine all day, but records were obtained only when all the conditions were comparable and when articles of the same kind and size were being done.

Similar variations were evident in other firms working the overtime day.

Length of Day	Time in Seconds			
	10 A. M.	3 P. M.	5 P. M.	7 P. M.
9 hours	7.7	8.9	9.3	—
10 hours	8.2	10.3	13 6	14.9

Figure 3 shows the variation in the length of the interval according to the time of day for eight laundries working the nine-hour day. Each laundry is represented by daily records for most hours of the day for a fortnight. Although the variations are not very great, the general shape of the curve is similar to many obtained in other trades. There is gradual decrease of efficiency. With one exception all were working the usual nine-hour day—five hours in the morning and four in the

afternoon with no acknowledged interval for tea. One laundry was an exception; here the day was arranged in two-

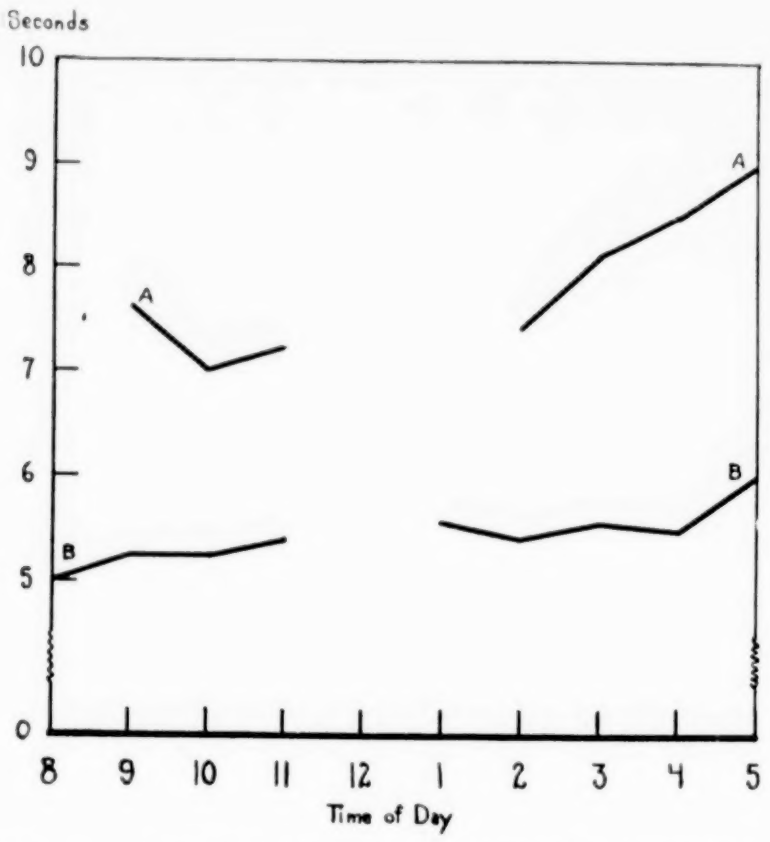

FIG. 3.—Average interval in seconds elapsing between the time when "feeders" took their hands off one article and placed the next in (A) eight laundries, and (B) a laundry providing rest pauses.

hour spells, with a ten-minute interval during which the workers left the works and went either to the canteen or into the garden. The interval in this establishment was much shorter than the average (see Fig. 3, curve B), and it was maintained almost all day. These records were obtained during the hot summer of 1921.

Collar Processes

Of the various processes connected with the washing and ironing of collars, the one selected for investigation was that of "collar steaming" (see Fig. 4). The collars prior to being steamed have been washed, starched, and "pulled out." The girl who steams them has to take each collar separately and place it on the table of the collar-steaming machine. When she has placed as many as the particular machine will hold, she pushes the table backwards and forwards so that the collars pass under a heated roller. The size of the machines varies, but the principle is the same for all. It was found impracticable to take hourly output because (*a*) collars vary in size, shape, and degree of decrepitude—a badly torn collar takes longer to place than a good one; (*b*) the pressure of the work varies, *i.e.*, there may be more to do at one hour than another;

FIG. 4.—Collar steaming machine.

(*c*) in some laundries the same girl may do all the collar processes and so be occupied in steaming for only a portion of the day. For these reasons it was decided to take a sample of her rate of working at as many hours of the day as she was engaged on that work and on the same type of collar. The collars selected were those known as "single." The length of time taken to place fifty collars on the table was the standard. Since no table holds fifty at once, sequences of smaller numbers had to be taken—*e.g.*, 8 placed in 24 seconds, 10 placed in 30 seconds, 6 placed in 19 seconds, 6 placed in 18 seconds. This gives

30 placed in 91 seconds. Records were obtained whenever the desired condition permitted.

A comparison of the variations according to the time of day for seven workers daily for a fortnight is given in Figure 5. The hours for which no sam-

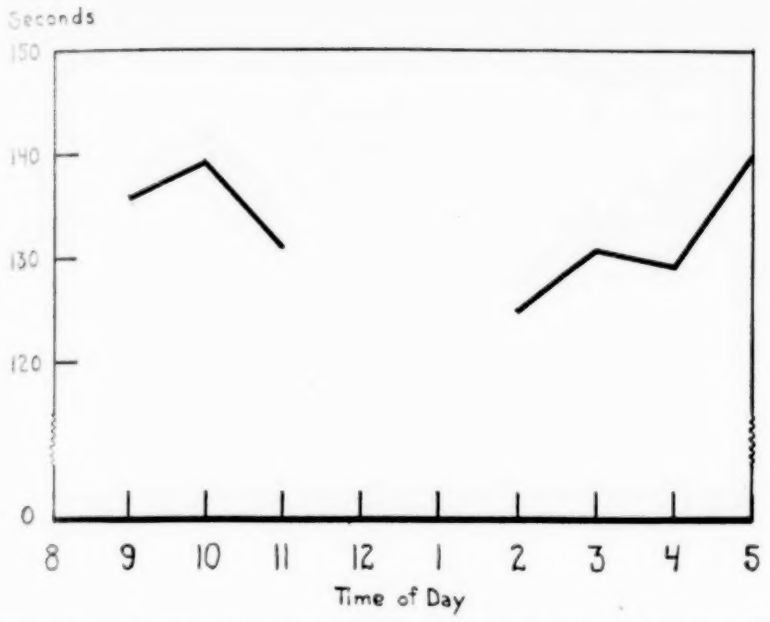

FIG. 5.—Time in seconds required to "place" fifty collars.

ple is given represent hours when there were not sufficient records for each worker. It will be noticed that the hourly variations are slight but that there is a falling off at the end of the day. The morning period is not well represented because at 8 A.M. the workers were often engaged in "pulling out" collars, preparatory to steaming them; and there are not enough records for 12 o'clock and 1 P.M.

Collar work is relatively light and is usually popular with those doing it. Many collar machinists assert that they prefer it to any other form of laundry work and frequently stigmatize as "monotonous" calendering and ironing.

Ironing

1. *Smoothing by Means of a Press.* (*see Fig. 6*).—A press is a machine by means of which large surfaces can be smoothed, giving the appearance of having been ironed. As in other laundry processes the wide range of articles dealt with on a press prevented any hope of getting output on a satisfactory basis. In one

FIG. 6.—A press.

laundry, however, during a very busy period one press was used almost entirely for the pressing of chefs' coats, and it was therefore possible to get output records for five weeks (see Fig. 7).

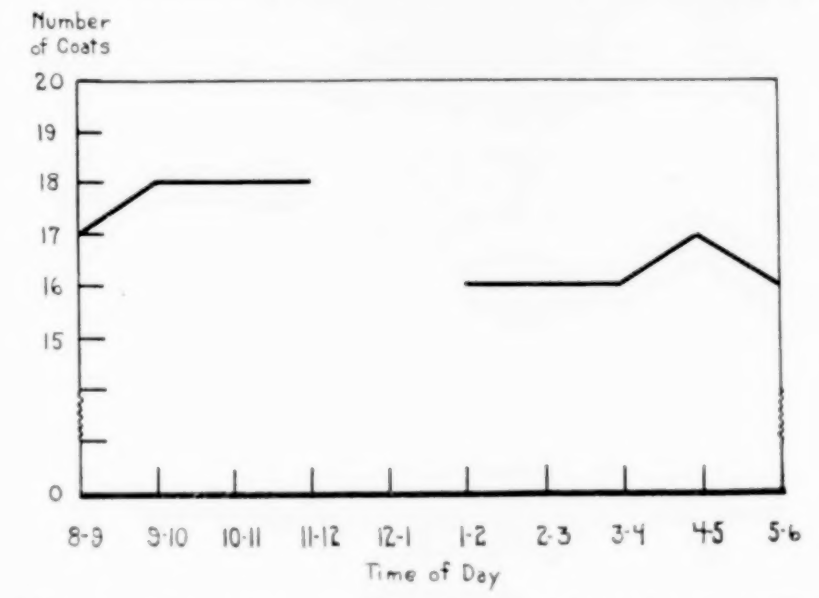

FIG. 7.—Average number of chefs' coats smoothed in an hour by a typical worker.

The afternoon rate is slightly slower than the morning rate as the work is fairly heavy and rather dull.

Two factors at least were operating: (1) the effect of the number of hours

worked; and (2) the gradual rise in temperature which became distinctly unpleasant during the afternoon.

As such a method of computation was not possible at any other laundry, other measures had to be devised. The interval used in calendering was unsuitable, and so it was decided to time that part of the process which was entirely under the worker's control—the bringing down of the lid. The time taken to bring the lid down ten times in immediate succession was taken as the sample. This was obtained by timing ten successive operations of the press and subtracting the time during which the lid was in position.

Worker	Time in Seconds		
	10 A. M.	2 P. M.	5 P. M.
A	7.9	8.4	11.1
B	11.0	14.1	11.2
C	12.0	12.2	14.7

Comparison of these workers shows that, as the day wore on, there was a gradual lengthening of the time which they took to perform this operation, but that the individuals varied as to where this set in.

Worker A was a very regular worker of the type that was disinclined to yield to subjective feelings of fatigue; if she felt weary she would intensify her efforts. She was quite unaware of this gradual lengthening of the interval, but she remarked that as the day wore on the lid became heavier. As this firm paid particular attention to the balance of the machines, it seems likely that the extra weight really referred to her growing weariness.

Worker B was invariably at her worst during the early afternoon but settled down to steady work after a cup of tea provided about 4 P.M.

Worker C showed a falling off during the late afternoon; in her case the afternoon was of four and one-half hours' duration unbroken by tea.

Both methods of investigation show the same result, a slight but regular decrease in efficiency during the afternoon.

2. Ironing by Hand.—A large part of the work of a laundry aiming at "finished" work has to be ironed by hand. For reasons already mentioned a measure of total output suitable for scientific purposes could not be obtained. After much experimenting with different classes of work it was decided to concentrate on shirt ironing, which is usually done by specialists and forms a regular part of the work of any laundry. The measure of efficiency was the average time taken to iron shirts of the type known as soft with double cuffs. Records were taken as often as possible during the working day. The problems dealt with were: (*a*) the length of the working day, and (*b*) rest pauses. Mass data could not be obtained, but every precaution was taken to make the data available as accurate as possible.

The actual amount of shirt ironing done by hand varies from firm to firm. In one firm (Laundry A) most of the smoothing had been done on machines before coming to the hand-ironer, who had merely to finish those parts that could not be done otherwise.

The worker whose records are given in Figure 8 was young and a very regular worker. When I visited the factory for the first time, the firm was working a ten-hour day which had already been operating for several days before I arrived. Records were obtained for a fortnight under these conditions, and later in the season, when the firm had been working the usual nine-hour day, further records were obtained for purposes of comparison.

The considerable falling off in the morning might have been due to the cu-

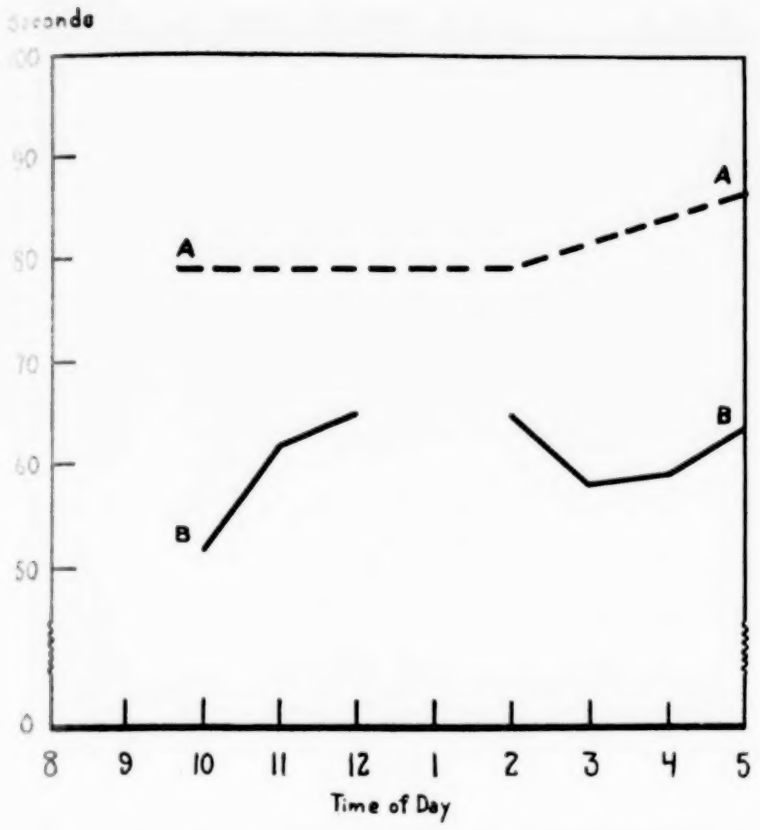

FIG. 8.—Average time in seconds required to iron a shirt (Laundry A). A = curve for ten-hour day; B = curve for nine-hour day.

mulative effect of the previous long day. Although there are only three periods a day represented in the curve for the ten-hour day, they are quite comparable. The worker was occupied all day for both the fortnights but in the one case I was not so successful in timing her on the particular class of shirt. The difference in the shirts was not great enough to affect her, but it was sufficient to prevent scientific comparison. The records given all refer to strictly comparable material. She was a very interesting worker to watch, for as the day wore on she became gradually more and more fussy about her work, tending to become less satisfied and giving an ultra scrupulous attention to unnecessary detail. She was quite unaware of the difference.

In Figure 9 records are given of four workers for a period of a fortnight. This firm (Laundry B) did more work by hand on each shirt than Laundry A. The figure shows very slight change for the morning period, an improvement in the afternoon after tea, and a substantial falling off during the last hour.

Hand-ironing, which is entirely under the control of the worker, obviously reflects the worker's condition more clearly than do processes in which part of the effect is obscured by the machine.

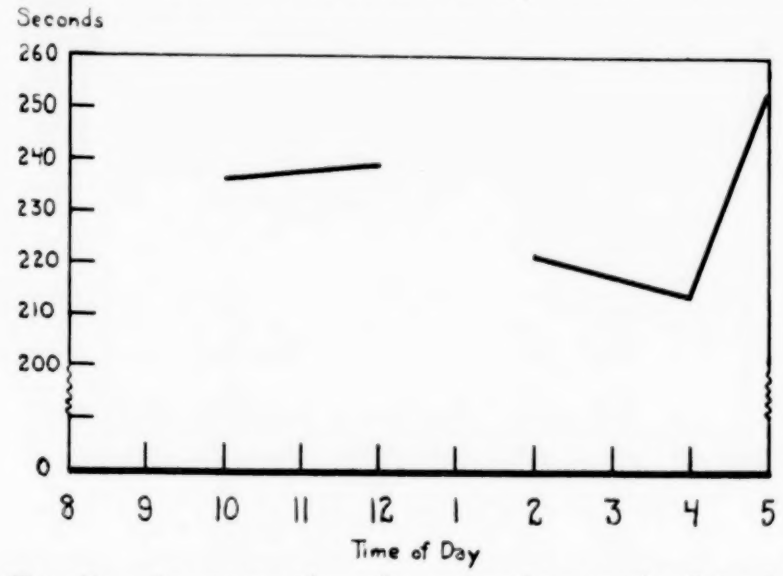

FIG. 9.—Average time in seconds required to iron a shirt (Laundry B).

Rest Pauses

It is customary in the laundry trade to divide the day into two periods of five hours and four hours, or four hours and five hours, respectively. Certain firms (but these seem to be in the minority) allow an interval for tea in the afternoon and some an interval in the morning also. The usual objection raised by the opponents of the definitely specified rest pause is that the work involves several involuntary pauses during the day owing to variations in the flow of the work from department to department, so that a voluntary pause is unnecessary. These involuntary rest pauses are, however, rather a source of irritation than of rest. It is irritating to have one's work stopped for an indefinite time by circumstances over which one has no control; it is beneficial to have a definite period recognized as one's own to occupy as one wills.

Actual measurement of the effect of rest pauses proved very difficult, but in the case of a hand-ironer of whose work many records had been taken, it was interesting to see the effect of a fifteen-minute break in the middle of the morn-

ing—a change which took place during the course of the investigation. Immediately after the rest the time taken to iron a shirt fell considerably.

Day	Time in Seconds Required to Iron a Shirt	
	Before Rest Pause	After Rest Pause
Tuesday	235	173
Wednesday	216	194
Thursday	203	195
Friday	187	160

This instance is given merely as an example; it cannot be taken as conclusive, but added to the fact that after the midday rest the worker always improved, it is suggestive.

In the firm that worked in periods of, roughly, two hours, it was noticeable that the regularity of the work was much greater than in other firms, and this is true of each department. It is probable that what is sometimes ascribed to the effect of tea is rather due to a psychological effect. It is much easier to settle down to a period of two hours' work than to an unbroken period of five hours. When there is no recognized rest pause, there is often a considerable amount of unrecognized wasted time.

Summary

1. The health of workers in laundries does not appear to be unsatisfactory.

2. Since this industry does not present opportunities for measuring activity directly by output, activity was investigated by timing definite movements in (*a*) calender work, (*b*) placing collars, (*c*) ironing by press, and (*d*) ironing by hand. The results obtained are in general agreement and indicate a slowing down toward the end of the day.

3. The effect of official rest pauses was investigated and found to be beneficial.

4. The data are not presented as conclusive evidence of the way in which activity diminishes as work proceeds, but rather as examples of method and suggestions for future research. Many trades are of a non-repetitive character, and in them some of the devices for measuring activity here described may prove useful.

J. I. H.
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BLASTOMYCOSIS AS A COMPLICATION OF INDUSTRIAL ACCIDENTS*

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WITH the great development in recent years of workmen's compensation legislation, especially since the passage of laws relating to compensation for occupational diseases as well as accidents, we have been forced to scrutinize more closely certain clinical entities, and in some cases, as a result of this scrutiny, to revise our ideas concerning them. Certain diseases have been brought more and more to our attention on account of their unknown and heretofore unsuspected relationship to certain occupations and to industry in general. Among the rarer conditions which may occasionally arise in connection with industry is infection with blastomycetes. This was brought forcibly to my attention a couple of years ago, when four cases, three of which were industrial, came under my care in the space of a few months.

The scope of this paper does not require an exhaustive consideration of the symptomatology, clinical characteristics, pathology, etc., of blastomycosis, since the disease is now pretty generally known and recognized, and, furthermore, many excellent papers are easily available in the literature for those who desire to study the subject more thoroughly. It is not out of place, however, to review briefly the salient features of the disease.

It exists in two forms—blastomycetic dermatitis, and generalized blastomycosis. The first case was reported in 1894, by Gilchrist, at the meeting of the American Dermatological Society in Washington. By 1910, some hundred cases had been recorded, chiefly in and around Chicago, so that for a time it was known as the "Chicago disease." In the past few years, however, it has been found to be distributed pretty generally over the entire world, cases having been reported from Germany, India, Italy, China, and South America.

Probably because of the ease with which accidental traumatic inoculation may occur, manual laborers mainly are affected. The cutaneous lesions are more numerous on the hands, arms, face, and lower extremities, very likely for the same reason. A favorite site is the eyelids, very serious cicatricial deformities being sometimes produced. The disease seems to show no special predilection for either sex; while it occurs principally in men, this is probably due to the fact that more men than women are engaged in manual labor. Age likewise seems to have but little influence, except in so far as the majority of cases occur during the years of greatest activity. It has occasionally appeared in clean surgical wounds, and has been acquired as an accidental infection, following autopsies on systemic cases.

As previously stated, it may present itself as a purely cutaneous disease, or it may appear as a systemic infection, in which case cutaneous manifestations are practically always present. The cutaneous form is the one which should interest us primarily as a compensable disease or injury. The first indication of this form of the disease is the appearance of a small red papule, probably at

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the site of some insignificant trauma, such as a minute abrasion. This papule soon becomes covered with a crust, which, when removed, reveals a papillary, oozing surface. By advancing at the periphery, the lesion slowly becomes larger; at the same time, a marked tendency toward healing, with the formation of a delicate new skin, is shown at the center. The advancing edge is raised, sharply defined, and separated from the healthy tissue by a distinct hyperemic zone. About the periphery are numerous miliary abscesses, containing a thin, glairy, mucoid pus and numerous organisms, frequently in almost pure culture. These abscesses constitute one of the diagnostic characteristics of the cutaneous lesions. There may be single or multiple, large or small patches. Occasionally, there is severe pain but usually none is present. The disease may never progress beyond this stage, and may remain purely localized for years, although, if untreated, it slowly continues to spread. It sometimes seems to be aggravated by trauma, which causes it to spread more rapidly and leads to systemic manifestations, although the latter may appear without any assignable cause. The systemic form may also appear without cutaneous manifestations primarily, these appearing later, or not at all.

Speaking of systemic blastomycosis, Hektoen says, "The general course and symptoms of the established disease are in the main those of a more or less chronic, essentially pyogenic, infection, with a special tendency to superficial localizations." While the onset may occasionally be acute, as a rule it is more or less gradual, resembling a generalized infection, with multiple skin lesions. Presumably, the atrium of infection is either a preexisting cutaneous blastomycosis or the respiratory tract. The organism has been found in ulcers of the stomach, thus suggesting the latter as a possible portal of entry. The disease frequently begins as a bronchopneumonia. From the distribution of the lesions, it would appear to be blood borne; in a few cases, indeed, the organisms have been cultivated from the blood. The most extensive lesions are usually in the skin and subcutaneous tissues; the disease also localizes in the lungs, liver, kidneys, adrenals, spleen, myocardium, spine, brain, bones, and intestines, particularly the colon. Cases involving the larynx, the prostate, and the vesicles have also been reported. The mucous membranes are rarely involved, although two or three cases affecting the tongue have been reported. The bone and lung lesions resemble those of tuberculosis; when there is pulmonary localization, the organisms appear in the sputum. Ascites may occur in hepatic involvement, and the infection may produce amyloid changes. Hektoen has found that the blood of a patient suffering from blastomycosis will agglutinate blastomyces. Secondary infection with bacteria may occur. Fever of low grade is usually present. A few cases of apparent spontaneous recovery are on record, but the disease shows a marked tendency to recurrence and recrudescences even after the lapse of years.

The organisms of the disease may be readily demonstrated in the pus from the miliary abscesses and in the tissues. By mixing a drop of this pus with a little *liquor potassae* on a slide, they are readily seen under the low power of the microscope, usually showing all stages of development. They may also be stained, as they take any of the ordinary stains well, one of the most satisfactory being polychrome methylene blue. These organisms belong to the yeast fungi, being spherical or oval cells of varying size

(from 3 to 30 microns). They have a double-contoured appearance, owing to the presence of a very refractive cell capsule. Increase is solely by budding in tissues or pus, no mycelia being formed, and the budding organisms are easily seen in fresh preparations. They grow well on all ordinary media, exhibiting varying cultural characteristics. Some show budding principally; others, and a larger number, produce mycelia; and still others, abundant aërial hyphae. Polymorphism is sometimes exhibited, in that the organisms may change their characteristics if grown on artificial media. Granular protoplasm and vacuolation are seen at times in the cells. Long mycelia, which break up into cells or segments of varying length after a few days, develop after about thirty hours, on artificial media. Microscopic growth does not appear for six to nine days, when white areas of radiating threads appear. From then on, the growth of mycelia is very rapid.

This, then, constitutes a fairly brief and general description of the outstanding features of cutaneous and systemic blastomycosis, and of the organisms of the disease. How the condition may be of interest as a compensable injury or disease is well shown by the following cases.

Case 1.—V. L., a married man, 57 years of age, and a laborer by occupation, was employed in a horse collar factory, where he was operating a machine used for cutting straw for filler. There was nothing of importance in the previous history. He presented himself for treatment for a cutaneous lesion upon the anterior aspect of the right wrist. This lesion was roughly circular in outline, about 5 cm. in circumference, and elevated from the surrounding skin. About it was a reddened inflammatory areola. The whole lesion was dusky red in appearance and showed a marked tendency to heal in the center and to advance at the periphery. Over the healed central portion was a thin scale-like skin, which, when removed, revealed new, apparently healthy, epidermis beneath. Outside of this, the tissue beneath the crust was moist and markedly verrucose in appearance. The entire periphery was the seat of numerous miliary abscesses, from each of which, when opened, a small drop of glairy yellow pus exuded. Smears from this pus showed the presence of numerous round, double-contoured bodies, in all stages of development, morphologically identical with oïdium blastomycosis. The same organism was grown from this pus in almost pure culture. The treatment followed was increasing doses of a saturated solution of potassium iodide, which effected a complete cure in the space of two months. This case was first seen in the month of May.

Case 2.—This was seen in November of the same year. It occurred in W. D., a single man aged 19, a hospital patient who had been operated upon for inguinal hernia. During his convalescence, he called my attention one morning to a lesion upon the middle finger of his left hand, wondering why it had persistently refused to heal. Upon being questioned as to its origin, he stated that about six weeks previously he had scratched the finger while working about a paper machine. (He was a paper maker by trade.) Upon closer examination, I found a condition exactly similar to the case described above, except that the lesion was smaller. The same organism was present, both upon microscopic examination and upon culture. Increasing doses of potassium iodide caused the disappearance of the lesion in about a month.

Case 3.—Early in January of the following year, I attended E. C., a married man 36 years of age, and an employee of a water company. He stated that on December 21 he was working upon some pipes in an excavation and accidentally scratched the back of his right hand upon a wrench which he had been using and which was lying submerged in some water in the bottom of the trench. The abrasion had refused to heal; on the contrary, it was slowly growing larger. Examination revealed a circular lesion, 3 cm. in diameter, on the back of the right hand. It was raised and had a sharply defined, inflammatory border. It was covered with a crust which, when raised, revealed the customary moist verrucose or papillary surface. About the periphery were numerous miliary abscesses. A drop of this pus examined microscopically showed almost a pure culture of spherical, double-contoured organisms in all stages. These were readily grown in culture. Complete healing occurred under treatment with potassium iodide.

Here, then, we have three patients, all engaged in widely different occupations. In two of them, the history is very definite as to trauma, and I think that the occurrence of this factor may be confidently assumed in the only case not mentioning it (Case 1). The disease developed immediately following the accident, leaving no doubt as to the relation of cause and effect. Fortunately, in none of these cases was there any disability; had there been, any one of them could have made and established a claim for compensation without any difficulty. As a matter of fact, Case 3 was referred to me as an industrial accident, and all expense in connection with it was paid by a compensation insurance company.

Several questions for discussion arise naturally in connection with these cases. In the first place, why should I have seen three cases of blastomycetic dermatitis in the short space of a few months, having seen none previously nor since? I have no answer for this. In the past fourteen years, I have treated a large number of injuries occurring under the same, or apparently precisely similar circumstances, and in none of them have I seen this complication. Naturally some doubt immediately arises as to the correctness of the diagnoses. If I had been particularly interested in the disease before this and had been on the lookout for cases, I might suspect that in my zeal to discover them I had been led into error. At this time, however, blastomycosis was farthest from my thoughts. Furthermore, I refused to admit the existence of the condition in each patient, until convinced by all the evidence—clinical, laboratory, and therapeutic—that it could be nothing else.

Secondly, can any conclusions be drawn from these cases which will aid us in establishing the natural history of the disease? I believe not, primarily because the series is entirely too small for any conclusions to be valid. The one influencing factor seems to be the occurrence of trauma, with the disease following directly upon it; the fact that two of the cases occurred during the colder months of the year is probably a coincidence. All gave negative Wassermanns.

Next, what was the source of the yeast organisms producing the disease? It is hardly reasonable to suppose that they were present on the various objects producing the traumata and under such dissimilar conditions. Some authors claim to have found them in the healthy skin, particularly, although not exclusively, in sebaceous regions. If this is true, the origin of the infection in my cases might possibly be explained on this basis; otherwise it is difficult to see exactly where it arose. When occurring in the healthy skin, the presence of these organisms is undoubtedly unexpected and temporary; otherwise, the disease would be extremely prevalent and widespread. Their normal habitat and distribution in nature are as yet unknown, as far as I am able to learn from the literature.

Lastly, why was cure so prompt and complete under treatment with potassium iodide in these cases, when ordinarily the disease is extremely refractory to treatment and so prone to recurrences and recrudescences? I assume that the reason for this was because all of the cases were seen very early, the condition present was recognized, and vigorous therapeutic measures were instituted immediately. I might say in this connection that no local applications of any kind were used, the lesions merely being protected by a dry dressing of gauze.

In conclusion, I would urge that all dermatoses occurring as occupational diseases or following minor industrial

accidents in which the diagnosis is not clear be studied closely with blastomycosis in mind, and I believe that cases will be found which would otherwise be overlooked. Certainly the disease is not common, or in a fairly large industrial practice I should have seen more cases of it; but in view of the extreme chronicity and disabling character of the established disease, the possibility of its transmission to others, its tendency to generalized systemic involvement, the production of extensive scars in advanced cases which eventually heal up, and the apparent ease with which it responds to treatment when the latter is instituted very early in the disease—in view of all this, from an economic standpoint alone every effort should be made to recognize it when it does occur.

ON CANCER-PRODUCING TARS AND TAR-FRACTIONS*

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ABOUT 150 substances are known to be present in coal tar, and there are, no doubt, very many more which are not yet known. The task of identifying the compound or compounds which cause tar cancer is therefore not likely to be easy. One may approach the question by considering

1. The chemical composition, and
2. The cancer-producing power of
   a. The different forms of tar;
   b. The different fractions into which tar can be separated;
   c. Liquids resembling tar in some respects—namely, Scottish shale oil and petroleum.

The cancer-producing power is ascertained (*a*) from *industrial evidence*, provided by official returns and clinical records of cancer occurring in workmen exposed to the various materials, and (*b*) from *experimental evidence*, obtained by the application of the materials to mice; in the case of substances and pure compounds which are not used industrially this is the only method available.

Part I

The Different Forms of Tar

The chief forms of tar are the following:

1. Wood tar.
2. Lignite tar.
3. Coal Tar — Gas-works tar, from
   a. Horizontal retorts.
   b. Vertical retorts.
4. Coal Tar — Blast-furnace tar.
5. Coal Tar — Coke-oven tar.
6. Coal Tar — Producer-gas tar.
7. Water-gas tar.

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It is known that, of these, lignite tar, gas-works tar, producer-gas tar, and probably coke-oven tar, produce cancer, while blast-furnace tar does not. We seem to have no information regarding wood tar[1] and water-gas tar in this respect; hence these tars need not be further described. What then is the factor which decides whether a tar shall or shall not have cancer-producing properties? In order to consider this question one must first state very briefly the mode of formation and the chemical characters of the different tars. The chemical composition of a tar depends largely upon the temperature to which it has been exposed; hence all the available data as to the temperatures reached in the various commercial methods of carbonization are of interest in this matter.

Lignite Tar

The first recorded cases of tar cancer occurred in the lignite tar distilleries in the neighborhood of Halle in Saxony. Volkmann (2) in 1875 described three cases, and subsequently other cases in the same district were recorded by Tillmanns (3) in 1880, and by Schuchardt (4) in 1885; and in 1892 Liebe (5) described the condition at that time of one of Volkmann's patients. According to Liebe's account, the tar produced by carbonization of the lignite was first treated with sulphuric acid and sodium

[1]Honda (1) produced in the mucous membrane of the tongue atypical epithelial growth, and in one case changes similar to those seen in cancer, by injection of the products of dry distillation of rice-bran; this material was probably similar to wood tar.

hydroxide (gas-works tar undergoes no such treatment before distillation) and then distilled, the three fractions of distillate being known as benzine, solar oil, and raw paraffin. He makes no mention of the pitch. The raw paraffin fraction was allowed to congeal in leaden vessels; the semi-solid material was then removed by hand, broken up in a machine, and placed in a press; after which the solid residue was wrapped in cloths and again pressed. Several of the cases of lignite tar cancer occurred among workers handling this raw paraffin fraction. These men are spoken of in the literature as "paraffin workers;" hence any one of the wide range of materials to which the word "paraffin" is applied may come to be regarded as a cancer-producing substance.

In considering this matter one may note the following facts: (*a*) These men were working with a crude tar fraction containing numerous substances other than paraffin; thus Schuchardt speaks of a paraffin worker occupied all day in emptying vessels of paraffin "gray from admixture with tar;" (*b*) Volkmann's second case (of cancer of the scrotum) "had to do with the liquid tar, the initial product of the factory;" (*c*) Volkmann says ". . . . but among those who handled the solid, purified (*fertigen*) paraffin exclusively I found no skin diseases." The same question as to the influence of the paraffins has to be considered in the case of shale oil, and the evidence is of a very similar character.

In the earlier days of the industry, horizontal iron retorts of D or other shape, very similar to the old gas-works retort, were in use (see Figures 2 and 3 given by Scheithauer (6)). They received a charge only 4 inches deep (cf. the lightly-charged horizontal gas retort, under "Gas-Works Tar," below), and were heated with a volume of *feuerkohle* (lignite yielding little paraffin) equal to that of the lignite carbonized; after eight hours' heating the coke was raked out. In 1858, however, Rolle introduced a low-temperature carbonization in continuously-acting vertical retorts. The temperature in the flues around the retort rose from 400° C. in the upper part to 600° in the lower, while the temperature of the vapor discharged was 120° to 150° C., and of the coke 360° to 400° C. Thus a low-temperature carbonization was substituted for one at a higher temperature; a similar change was brought about in the Scottish shale oil industry by Young (see section on Scottish shale oil, below). The new retort of Rolle, with slight modifications, came into use in time throughout the industry, and has not been superseded at the present day. The question then arises, is it possible to ascertain whether both the older high-temperature tar and the newer low-temperature tar can produce cancer?

The earlier papers on tar cancer consist almost wholly of very lengthy descriptions of clinical and microscopic appearances; of the four authors mentioned above, Liebe is the only one who makes any attempt to give an account of the all-important factor—namely, the tar. Fortunately he took his information in part from a tar worker who had been one of those seen by Volkmann on account of tar dermatitis in the seventies. When Liebe wrote (in 1892), this man was still employed in the tar works, and was suffering from epithelioma of the scrotum; he was therefore well acquainted with the manufacture of the cancer-producing tar. Liebe says that after the carbonization of the lignite "has continued for six to eight hours the residual red-hot coke is removed from the retorts with iron rakes; on coming in contact with the air it often throws out high columns of flame." These few words alone show beyond any doubt that the old retorts were in use; no such raking out of inflammable coke could occur with the vertical retorts, of which Liebe speaks further on as "not yet generally introduced." Evidently some, at least, of the recorded cases of lignite tar cancer were caused by the high-temperature tar.

It is noteworthy that the publication of such cases in German medical journals seems to have ceased, though the industry is by no means extinct; in 1920, 2,649 workmen were engaged in the production and fractionation of 51,916 metric tons of the tar in question (Scheithauer (6, second edition, 1922)). A search through the Surgeon-General's Catalogue and through the *Zentralblatt für Gewerbehygiene* brought to light nothing new on this subject since 1885, except Liebe's pa-

per of 1892.[2] Zweig (7) in 1909 claimed to have examined the literature closely for cases of tar cancer, and he spoke of Liebe's paper as "die letzte grössere Arbeit über den Teer- oder Paraffin-krebs;" and similarly, no later cases could be found in the German literature by Gawronsky (8) in 1904. To settle the question whether lignite tar cancer still occurs in Saxony one would require to examine reports (*Jahresberichte der Gewerbeaufsichtsbeamten*) which are not available here.

So much confusion has been introduced into the literature by the continual re-publication of the same cases of lignite tar cancer that it is necessary to tabulate the names of the patients mentioned by the various writers in order to ascertain what is the actual total number of cases; thus the case of Friedrich Seidler is described at full length by four different authors. The ten cases which form the basis of the twenty-eight descriptions by five authors are the following:

Patient's Name	*Site of Epithelioma*	*Year of Admission to Hospital for Epithelioma*
1. Heinecke	Scrotum	1873
2. Kötteritsch	Scrotum	1873
3. ?	Scrotum	1873
4. Seidler	Scrotum and arm	1877
5. Jacob	Scrotum	1878
6. Fischer	Scrotum	1881
7. Falke	Scrotum	1882
8. König	Arm	1884
9. Thiele	Arm	1885
10. Schröder	Scrotum	1890

These, ten in all, are the only cases of lignite tar cancer which I have been able to find in the literature. It is especially noteworthy that only one case appears in the last thirty-eight years. It seems then, so far as one can judge from the literature, that a certain form of industrial cancer has ceased to occur, and it is obviously of practical importance to ascertain how this has come about. Several possible explanations would have to be considered, such as (1) that the workmen do not remain so many years in the employment; (2) that they do not come so much into contact with the tar—even in Liebe's time this change was taking place (5, p. 70); (3) that better provision is made for washing—such precautions were being taken in 1885, but they were not always effectual, for Liebe in 1890 noted that his patient Schröder (No. 10 on the list), who had access to excellent facilities for washing, "badete nie;" (4) that the tar may have ceased to have cancer-producing properties—this could, of course, be tested experimentally by workers in Halle.

A list of the known constituents of lignite tar, forty-one in number, is given by Scheithauer (6); the only ones which seem not to have been demonstrated with certainty in coal tar are an olefine ($C_{10}H_{20}$), picene, and guaiacol. The large amount of paraffin present in lignite tar even when produced at high temperatures may seem inconsistent with what is said below in the account of high-temperature coal tar. But the lignite of the Halle district which is used for tar production (*Schwelkohle*) contains a substance called pyropissite, which yields up to 62 per cent. of paraffin on distillation. This, and similar substances, is much less abundant in other forms of coal—a fact which seems to account for the large yield of paraffin from lignite containing it, even at retort temperatures at which some destruction of paraffins occurs.

Gas-Works Tar

Deelman (9) compared the action upon mice of the horizontal retort tar and the vertical retort tar of the Amsterdam gas-works, and found that the latter produced cancer much more slowly than the former ("Beim Vertikalteer . . . treten die Carcinome aber erst nach viel späterer Behandlung auf."). He does not state the actual difference in average time of development. Both tars produce at first papillomata; the change from the innocent to the malignant stage takes place sooner in the tumors produced by the horizontal retort tar. This observation, *if it is confirmed by experiments with vertical and horizontal retort tars known to be prepared from one and the same sample of coal*, will be of considerable interest. One must now consider (1) the differences in chemical composition between the tars from horizontal, inclined, and vertical retorts, and (2) the cause of these differences.

When coal is subjected to destructive distillation or carbonization, the com-

[2] In 1886, Eckardt published in Halle a thesis "Vier neue Fälle von Paraffinkrebs;" a copy of this was obtained and it was found that the four "new" cases were those described a year previously, and for the most part in the same words, by Schuchardt (4).

p tion of the products, (gas, tar, and co e) is dependent upon the temperature at which the decomposition is carried out; thus the constituents of a tar formed at 350° C. are almost wholly different from those of a tar formed at 900° C. The interest of Deelman's result lies in the fact that vertical retort tar contains more of the products of relatively low temperatures, and hence one would look for the cancer-producing substance among those which are formed in increasing amounts at the higher temperatures. No one would expect a very large difference in the cancer-producing powers of the two tars, for their chemical composition differs only quantitatively, but any such difference which can be demonstrated with certainty is of value. In the next section, the composition of tars produced at low and at high temperatures is compared; statements for which no other authority is given are taken from the writings of Lunge (10), Lewes (11), Spielmann (12), Warnes (13), Alwyne Meade (14), and McCulloch and Simpkin (15).

Low-Temperature Tar.—At 300° to 350° C. gas coal becomes semi-fluid and begins to give off tar vapor. The composition of the low-temperature tar formed between 400° and 500° is as follows:

1. *Paraffins, olefines,* and *naphthenes* are abundant. Fischer and Gluud (16) isolated from such a tar obtained from a Mond gas plant six solid paraffins from $C_{24}H_{50}$ to $C_{29}H_{60}$, the most abundant being $C_{26}H_{54}$ and $C_{27}H_{56}$. Börnstein (17) found up to 2.1 per cent. of solid paraffins (melting point 55° to 60° C.) in tar obtained by the slow carbonization of coal at temperatures rising to 450° C.

With regard to the olefines, see under "High-Temperature Tar," and the analysis of a vacuum tar by Jones and Wheeler below. Pictet and Bouvier (18) isolated six naphthenes of composition between C_9H_{18} and $C_{13}H_{26}$ from a vacuum tar obtained from coal at 15 to 20 mm. Hg and up to 450° C.

2. *The aromatic compounds* consist chiefly of phenols, which may make up 50 per cent. of the tar. They are chiefly polyhydric phenols, carbolic acid being present only in very small amount. Fischer (19) gives the following example:

Phenols of a Low-Temperature Tar from a Gas Coal Carbonized not above 450° to 500° C.

	Per Cent. of Water-Free Tar
Carbolic acid	0.06
Cresols	1-2
Xylenols	1-2 ?
Pyrocatechin	0.25
Of higher boiling point than xylenols, not yet identified	30-32
Acid resins	10
	45

α- and β-methyl naphthalenes appear to be present, and perhaps di-methyl naphthalenes as well (20) (21), but naphthalene itself is not formed below 750° C. and hence is absent (22). Fischer considers the absence of naphthalene a useful sign of a good low-temperature tar. Anthracene is present in small amount, if at all. Iso-methyl anthracene and crackene were found by Börnstein (17) in tar from a semi-bituminous coal carbonized below 500° C. Benzene is formed only in very small quantities below 500° C.

3. *The nitrogenous bases* of low temperature tar (from the "Carbocoal" process, (23)) differ in density and molecular weight from those of high-temperature tar, but the compounds have not been isolated. Toluidines appear to be present in Pictet's vacuum tar (24); they have not been identified in high-temperature tar.

4. Free carbon[3] amounts to 2 per cent. or less, and the tar yields from 20 to 40 per cent. of pitch.

An interesting example of a low-temperature tar is that obtained by Jones and Wheeler (20) from coal in vacuo up to 430° C. The portion of this tar distilling below 300° at ordinary pressure contained:

[3]Free carbon is the portion of tar or pitch insoluble in solvents such as benzene or carbon disulphide. It contains about 10 per cent. of oxygen, hydrogen, nitrogen, sulphur, and ash taken together, and not more than about 90 per cent. of carbon. The organic compounds in it have not been identified. The amount of free carbon is in practice a useful measure of the quality of the tar, and of the heat to which it has been subjected.

	Per Cent.
Olefines and other unsaturated hydrocarbons	40-45
Naphthenes and liquid paraffins, the former predominating.....	about 40
Traces of a solid paraffin, $C_{27}H_{56}$.	
Phenols, chiefly cresols and xylenols	12-15
Aromatic compounds; apparently homologues of naphthalene.....	about 7
Traces of pyridine bases.	
No benzene, naphthalene, anthracene, phenanthrene "nor solid aromatic bodies generally."	

These low-temperature tars are no longer merely laboratory products; they can be produced on an industrial scale (*e.g.*, the Maclaurin process (25)).

High-Temperature Tar.—One may compare with these low-temperature tars formed below 550° C. the tar produced in the ordinary gas-works carbonization in horizontal retorts heated to from 900° to 1,100° C. or higher.[4] In the latter tar

1. *The paraffins* are described as "present in such small quantities as to be almost negligible" (11, p. 151) or as "only traces" (13, p. 3). The liquid paraffins from pentane up to decane, $C_{10}H_{22}$, have been isolated, but with regard to solid paraffin "a doubt exists as to whether it has ever been found in a tar from a true bituminous coal" (11, p. 138). Where solid paraffins have been found in gas-works tar it is probable that some cannel coal or shale has been added to the gas coal (10, p. 50). In laboratory distillations of coal the evolution of paraffins ceases "practically entirely" above 700° C. (26). Coal carbonized at about 600° yields in the crude naphtha fraction nearly fifty times more paraffins and naphthenes together than it gives at about 800° C. (27). The presence of paraffins is very undesirable if the tar is to be used as a source of benzol, toluol, or anthracene; hence the amount of paraffin in such tar is purposely kept as low as possible by maintaining a suitably high temperature during carbonization.

2. *Olefines* are present in "insignificant" amounts (10). "Ordinary coal tar oils, particularly the lower fractions, contain very little olefines. In ordinary crude benzol from coal tar, the olefines present, which are removed as 'acid tar' with strong sulphuric acid, amount to about from 2 per cent. to 4 per cent. of the whole. A fraction of similar range of boiling point obtained from low-temperature tar lost over 50 per cent. of its volume as 'acid tar' on washing with strong sulphuric acid" (22). Tar from a gas coal carbonized at 1,215° C. contained only traces of aliphatic hydrocarbons (28).

3. *Naphthenes* have been found in lignite tar by Heusler (29), who judged that they amounted to a few units per cent. The only naphthene which has been identified in ordinary coal tar is nonanaphthene, C_9H_{18} (30); apart from this statement there seems to be no definite evidence of the presence of these compounds in high-temperature tar. Those naphthenes which have been tested—cyclohexane, methyl cyclohexane, dihydronaphthalene and tetrahydronaphthalene (31)—were found to be decomposed at or below 500° C., so that any of these compounds present in high-temperature tar must have escaped from the retort through the cooler parts of the charge.

4. *The phenols* are much less abundant than they are in low-temperature tar. The percentage of phenols in the crude naphtha fraction of tar can be halved by raising the temperature of carbonization roughly from 600° to 800° (27). Further, carbolic acid is in greater amount than are the other phenols, whereas in low-temperature tar the latter are much more abundant. About 1 per cent. of carbolic acid is present in ordinary coal tar, and 0.06 per cent. in a low-temperature tar (see Fischer's table p. 465; also the data given under "Blast-Furnace Tar").

5. *Aromatic compounds other than phenols* are present which are either absent from, or present in much smaller quantities in, low-temperature tar (benzene, naphthalene, anthracene, phenanthrene, and many others).

6. The free carbon amounts to from 17 to as much as 30 per cent. of the tar, and the tar yields from 50 to 70 per cent., or even more, of pitch. In Wright's experiments (27) the proportion of pitch in the tar was more than doubled when the temperature of carbonization was raised approximately from 600° to 800° C.

Vertical Retort Tar.—The tar produced in vertical retorts differs from the tar of horizontal retorts (*i.e.*, the

[4] All such statements of temperature refer to the walls of the retort, not to the charge; the latter would not reach retort temperature throughout for many hours, if at all (10, p. 97).

high-temperature tar described in the preceding section) in that it presents in some degree many of the features of the low-temperature tars formed below 550° C.; it is intermediate in composition between a high-temperature and a low-temperature tar. The composition of tar from any one class of retort varies over a fairly wide range in accordance with differences both in the methods of carbonization adopted in different gas-works and in the varieties of coal employed. The following figures, taken from the reports of a number of workers upon many different tars, will serve to show the general contrast between the two kinds.

	Per Cent. of Tar	
	Horizontal Retort	*Vertical Retort*
Free carbon	12 to 30	2 to 7
Pitch	55 to 70	40 to 50
Paraffins in naphtha fraction (32)	Less than 0.023	0.23
Cresols (32)	2.45	5.90
Naphthalene (32)	4.60	3.40
Benzene (33)	1.40	0.70
Toluene (33)	0.50	0.30
Paraffins (33)	Slight trace	0.30
Tar acids—*i.e.*, phenols—(Drury, quoted by Lewes (11)	3.00	5.30

Church and Weiss (34) give the following table, which contains data about some of the other tars as well:

	Free Carbon Per Cent. of Crude Tar
Gas-house, horizontal	28.90
Gas-house, inclined	24.30
Gas-house, vertical	4.00
Coke-oven (Otto-Hoffmann)	9.80
Coke-oven (Semet-Solvay)	10.80
Water-gas (Eastern)	0.10
Water-gas (Central)	0.40
Blast-furnace (Scotland)	15.90[1]
Pine (Florida)	0.03

[1] The authors do not state whether this rather high figure includes ash, which is very abundant (10 per cent. or more) in blast-furnace tar.

Walmsley (35) found indications of trihydric phenols in a vertical retort tar (cf. Fischer's table of phenols, p. 465). Some vertical retort tars contain practically no naphthalene. The amount of anthracene in horizontal retort tar is usually about four times that in vertical retort tar.

One may summarize the contrast between low-temperature and high-temperature tars roughly as follows:

Substances More Abundant in Low-Temperature Tar	*High-Temperature Tar*
Paraffins	Free carbon
Olefines	Carbolic acid
Naphthenes	Aromatic compounds other than higher phenols and methyl naphthalenes.
Phenols other than carbolic acid	
Methyl naphthalenes	

One must now consider the cause of these differences in composition between the tars from horizontal and vertical retorts.

The Various Forms of Retorts Used in Gas-Works.—The temperature to which the tar is exposed, and hence its chemical composition, are dependent upon the form of retort in which the coal is carbonized. It is necessary therefore to consider very briefly the different kinds of retorts, and the methods of charging these with coal.[5]

a. The lightly-charged horizontal retort. When a charge 6 inches deep is placed in a D-shaped horizontal retort 15 inches high with its walls at a temperature of 1,000° C., this thin layer of coal is heated throughout comparatively quickly; the coal at the bottom of the charge reaches 700° C. in fifteen minutes, while the middle of the charge reaches this temperature in about an hour (11, p. 100). There is then no cool way of escape for the tar vapor, a good deal of which

[5] A discussion of the very complex conditions prevailing in the various temperature zones in these retorts will be found in Lewes' book (11, Chap. V). To describe the matter clearly would require the preparation of a series of diagrams such as one does not find even in books devoted to the subject; the nearest approach to such figures that we have found are those given, for vertical retorts only, by Meade (14, p. 434).

comes in contact with the hot roof of the retort. In such retorts the most extreme types of high-temperature tar can be produced.

b. The fully-charged horizontal retort. The raising of the central part of the charge to its maximum temperature takes several hours longer than in the case of the lightly-charged horizontal retort (see the striking table of temperatures given by Meade (14, p. 433)); a part of the gas and tar finds its way to the mouth of the retort through this cool central core without exposure to a very high temperature. The tar may be said to be roughly intermediate in composition between those from (*a*) and those from (*d*) and (*e*).

c. The inclined retort, which is in action intermediate between the horizontal and vertical retorts, is not coming into general use and need not be mentioned further.

d. The vertical retort, intermittently charged. The weight of the coal of course causes a vertical retort to be fully charged. When carbonization of a charge has proceeded for a time, a cross-section of the retort would show a hot outer zone of coke, then a zone of pasty decomposing coal, and a cool central core of intact coal (see the diagrams given by Meade (14, p. 434), and the table given by Lewes (11, p. 104)). The tar vapor probably escapes on both sides of the pasty zone, and is thus exposed both to high and to low temperatures. The pasty zone advances inwards until the whole charge is coked.

e. The vertical retort, continuously charged. Coal is introduced at the top and coke withdrawn at the bottom, uninterruptedly; hence the charge is never coked throughout, and there is always a conical mass of coal in the upper part of the retort at a low temperature, through which tar vapors can pass. Of the tars produced in gas-works, these show the most "low-temperature" character.

There is in progress in this Institute a series of observations on the effects upon mice of horizontal and vertical retort tars, and of a low-temperature tar produced at a retort temperature of 600° C. (36), for which we are indebted to the kindness of the Fuel Research Board. One would of course prefer that the different tars compared in such experiments be derived from the same stock of coal, but this has not been found practicable. We do not yet know whether different kinds of gas-coal carbonized in the same manner yield tars of equal cancer-producing power. The experiments of Börnstein (17) showed considerable differences in composition between the tars produced from different coals under the same conditions of carbonization. Thus in Deelman's experiment, it is possible that the vertical retort tar was derived from a coal which would even at higher temperatures have yielded a tar rather deficient in cancer-producing power. His experiments need to be repeated with tars derived from a single sample of coal. This question is dealt with further in the next section, under "Blast-Furnace Tar."

At this point one may mention the remarkable case of *cancer aigu* described by Bang (37). A workman when opening "la porte d'une cornue" (*cornue* is usually rendered by *retort*) was splashed in the left nostril by very hot tar. The account does not make clear what operation was in progress. An epithelioma developed at the spot within sixteen days, but since the man had been employed in the gas-works for nineteen years, it is just possible that he was about to develop a tar cancer at this spot. The tar on the day of the accident "était d'une consistance extraordinaire, si bien qu'il donnait par coagulation, après refroidissement, une substance dure comme l'asphalte ou le brai, tandis qu'ordinairement le goudron produit dans les cornues est de la consistance du sirop." This description of the tar suggests an excess of free carbon due to overheating.

Blast-Furnace Tar

The fuel used in the great majority of blast furnaces in England and the United States is coke, but in a few furnaces anthracite is used; neither of

these fuels yields any tar. The ordinary bituminous coal cannot be used because the softening and caking of such coal when heated causes mechanical difficulties in the working of the furnace. The furnaces of most Scottish iron works, and of a few in the north of England, are fed with a coal occurring in the west of Scotland known as "splint coal." This does not soften on heating and undergoes coking with practically no change of form, yielding a strong coke which is not crushed by the weight of the ore. The upper part of the furnace then becomes a coke-oven in which gas, tar, and coke are produced, the tar being recovered by condensation from the escaping gases. In 1900, 120,000 tons of this blast-furnace tar were produced.

Splint Coal.—The analyses given below show that splint coal contains more oxygen and nitrogen, and less carbon, than do typical gas coals, although some examples of gas coal may overlap the splint coals in composition. The figures have been recalculated for ash-free and water-free coal.

Composition of Gas Coal and Splint Coal

	C	H	O	N	S
Examples of Gas Coals	%	%	%	%	%
Wright (27), a coal "much esteemed for its gas-making properties"	84.2	5.5	7.0	1.3	2.0
Meade (14), "a typical gas-making coal"....	82.8	5.7	9.1	1.6	0.8
Börnstein (17):					
Gaskohle I	86.7	5.3	5.6	0.8	1.6
Gaskohle II	85.1	4.8	8.0	1.1	1.0
Range of Composition of English Gas Coals					
Drehschmidt, given by Bertelsmann (28)	75.3 to 86.2	3.2 to 5.9	5.5 to 17.1	1.1 to 1.9	0.97 to 3.93
Splint Coals. W. Jones (38)					
Used at Gartsherrie..	78.3	5.8	13.6	1.5	0.8
Greenhill	80.1	5.6	11.6	1.6	1.1
Roseball	81.7	5.8	10.0	1.6	0.9
Roseball soft	80.8	5.7	11.5	1.4	0.6
Earnock Ell	81.5	5.8	10.1	1.6	1.0

Composition of Blast-Furnace Tar.—Unfortunately the composition of this tar has been but little investigated. On this subject I have found only the work of Watson Smith (39) carried out about forty years ago, some confirmatory analyses by Allen and Archbutt (40), and a few data from American workers. Watson Smith examined the tar of the Gartsherrie Iron Works, paying attention especially to the phenols, which are particularly abundant in blast-furnace tar, making up about one-fifth of its volume. His results may be described most briefly in tabular form:

Phenols of Blast-Furnace Tar and Gas-Works Tar

		Crude Phenols % by vol.
Extracted by caustic soda from carbolic oil fraction of	gas-works tar	5.0[1]
	blast-furnace tar	17.5[2]
Extracted by caustic soda from creosote-oil fraction of	blast-furnace tar	14.3
Extracted by stronger caustic soda from carbolic-oil and creosote-oil fractions of	gas-works tar	9-10
	blast-furnace tar	23-24

[1]Crystallizable carbolic acid 65% of crude phenols.
[2]Crystallizable carbolic acid 1.33% of crude phenols.

It is evident that in blast-furnace tar the phenols as a class are much more abundant, while phenol proper or carbolic acid, C_6H_5OH, is much less abundant, than in gas-works tar.

The crude phenols extracted by soda from the blast-furnace tar were found to be made up of (1) phenol, C_6H_5OH, in very small amount as is shown above; (2) the cresols, $C_6H_4CH_3OH$, chiefly *m*-cresol; (3) xylenols, $C_6H_3(CH_3)_2OH$, chiefly *m*-xylenol, [1, 3, 4]; (4) pseudocumenol, $C_6H_2(CH_3)_3OH$; (5) α- and β-naphthol, $C_{10}H_7OH$. The relative abundance of these different compounds, except in the case of the first member of the series, is not indicated.

Other compounds found were toluene and xylene—the proportion of meta-xylene being about 70 per cent., as in gas-tar; the trimethyl benzenes, mesitylene, and pseudocumene; and naphthalene in small amount. From the creosote and carbolic oil fraction 11 per cent. by volume of crude bases was extracted by sulphuric acid; aniline was identified; and the odors of quinoline and pyridine were noticed. Paraffin wax amounting to 1 per cent. of the tar was obtained. The author seems to imply that liquid paraffins were present in abundance, but this is not clearly expressed. Neither benzene nor anthracene could be detected, "but I am convinced some anthracene is present."

Blast-furnace tar contains a very much larger percentage of ash than does gas-works tar; the former contains 10 to 15 per cent., the latter up to 1 per cent., of ash, and there are of course similar differences in the corresponding pitches. (See various analyses given by Abraham (41, pp. 243, 253.)

The data given by Watson Smith suffice to show that blast-furnace tar possesses three characteristics of a low-temperature tar—namely, (1) presence of higher paraffins in distinct amount; (2) abundance of phenols other than carbolic acid; (3) small amount, or absence, of benzene, naphthalene, and anthracene.

The Conditions of Temperature in a Blast Furnace.—One must now consider very briefly the conditions of temperature under which this tar is formed; the account given is taken from Lowthian Bell (42), Greenwood (43), and Turner (44).

The charge (ore, coal or coke, and limestone) is introduced unheated at the top of the furnace, and passes down the shaft to the hearth, where the temperature is about 2,000° C. The charge sinks at the rate of from 20 inches to 5 feet per hour, the more rapid rates being usual with modern methods. If the height of the charge were 70 feet, the time of transit would thus be not less than fourteen hours, while in some Scotch furnaces it is, or was formerly, as much as three days (Greenwood). Lowthian Bell in 1884 gave the following table of temperatures, taken at the side of the shaft. (I have been unable to find any results obtained by modern methods.)

Height of Charge		Temperature
ft.		°*C.*
Top 72		- -
68		340
63	Dull red	450
60		540
58	Red	650
50	Full red	820
44	Bright red	930
40		980
28		1,010

Taking these figures as correct, it is clear that the conditions are provided for a low-temperature carbonization. Coal travelling at 5 feet per hour would not reach the temperature which is considered the upper limit for the production of a true low-temperature tar (550° C.) for two and one-half hours,[6] and would not reach the temperature of the walls of gas-works retorts (say 1,000° C.) for a further six hours. Moreover, the escape of the volatile products to cooler regions is greatly assisted by the blast, which causes a current of gases passing upwards through the charge at a rate estimated at considerably more than 20 inches per second.[7] One has no means of learning the highest temperature to which any of the volatile products are exposed; but it seems clear that at any rate a very large part of these must be carried off before the temperature of the charge rises above 700° C.

[6]Mellor (Modern Inorganic Chemistry, 1917, p. 489) speaks of the charge as reaching 600° C. after falling 20 or 30 feet. This rate would, of course, be still more favorable to low-temperature carbonization.

[7]The idea might suggest itself that a cancer-producing substance present in the tar as first formed in the furnace is oxidized by the blast; but this is unlikely, for the gases in the upper part of a blast furnace are free from oxygen, the whole mechanism of the furnace being designed to promote the combination of oxygen with carbon. Thus at the level where the temperature is 600° and the distillation of tar would be in progress, the conditions are such that Fe_2O_3 is reduced to Fe, and CO_2 to CO (Mellor, *loc. cit.*).

The Absence of Cancer-Producing Power in Blast-Furnace Tar

Industrial Evidence.—An examination of workmen dealing with blast-furnace tar and pitch by Dr. Legge in 1910 led to the exemption of briquette works in which blast-furnace pitch alone is used from certain regulations designed to protect workers liable to pitch cancer, for the men in question were found not to show the characteristic lesions of pitch workers in such degree as to call for regulations, and no case of epithelioma or of conditions preceding it could be learned of among them (45). Further, since January 1920, when epitheliomatous ulceration due to tar and pitch became notifiable to the Home Office, no case traceable to blast-furnace products has been so notified (46).

Experimental Evidence.—No tumors were produced in an experiment by Dr. Leitch, of eight months' duration, in which blast-furnace tar was applied to a series of 100 mice.

It has been shown above that blast-furnace tar, or at any rate a very large portion of it, is produced by carbonization at comparatively low temperatures; and that the tar has the chemical characters of a low-temperature tar. But one cannot conclude that this is the reason why this tar lacks cancer-producing power, for one does not know whether splint coal can yield a high-temperature tar which produces cancer. No one has performed the decisive experiment, namely, to carbonize splint coal by the ordinary methods of the gas-works, and to test the action of the tar formed upon mice. It is well known in gas-works that different kinds of coal carbonized by identical methods may not yield by any means identical tars; this fact is shown also very clearly by the differences between the low-temperature tars produced by Börnstein (17) from different coals under exact laboratory conditions. One must bear in mind also that the chemical reactions taking place in a blast furnace are even more complex than those which occur in a gas-works retort; some reaction by which a cancer-producing substance is destroyed may be promoted by iron or calcium, both of which are present in such large quantities. At present, then, it is uncertain whether the inability of blast-furnace tar to produce cancer is due to the nature of the coal, to the temperature of carbonization, or to some reaction which is dependent upon the peculiar chemical conditions in a blast furnace.

Coke-Oven Tar

There is no direct evidence as to the cancer-producing power of the coke-oven tar produced in this country, and its chemical composition has not been studied in detail. In a coke oven a good deal of the tar vapor is forced to pass through the hotter regions by close packing of the cooler materials; hence "coke-oven tar is nearer to the lightly charged horizontal retort tar than to the modern more paraffinoid tar" (11, p. 153). Again, "the available evidence seems to show that the yield of benzene and toluene from various retorts is roughly in the following order: horizontal retorts, inclined retorts, coke ovens, vertical retorts" (Searle (11, p. 269)). The amounts of benzene and toluene may be taken as a rough indication of the temperature to which the tar has been exposed.[8] It would be surprising, then, if this tar did not produce cancer. One may note that great quantities of the pitch from coke-oven tar, together with gas-works pitch, are used in the briquetting industry, which gives rise to more than half of the cases of epithelioma notified to the Home Office (46).

[8]See the table under "Vertical Retort Tar."

Leymann (47) mentions four cases of cancer (two of the scrotum, one of the penis, and one of the forearm) occurring in coke-oven workers in Germany, but he gives no details.

Producer-Gas Tar

In the report of the Senior Medical Inspector of Factories for 1921 (48) one reads under the heading *Epithelioma-tous Ulceration* that "Three of the cases reported among tar workers reveal a new source of danger, as they occurred to stokers employed on the top of producer plants, who are exposed to escaping fumes when manipulating the coal at the poke holes. The scrotum was the part affected. One of these cases died from the cancer early in 1922."

It is extremely unlikely that these cancers are due either to any gas, or to ash, which may escape from the plant; they are in all probability caused by the condensing tar vapor.

In a producer-gas plant, peat, lignite, oil-shale, bituminous coal, anthracite, or coke can be used as fuel. No tar is formed when anthracite or coke is used (41). A bituminous coal yields in a producer plant from 3 to 5 per cent. of its weight of tar, which is as much as it would give in a gas-works carbonization. No detailed examination of producer-gas tars appears to have been made, but according to Abraham they are similar to gas-works tar. The low-temperature type of tar obtained from the Mond plant has been mentioned in the section on gas-works tar; but in at least one of the other types of plant the temperature reaches 1,150° C. in the zone of oxidation of carbon, and 980° in the zone of reduction of water. There are considerable differences in the various plants in the exposure of the tar vapor to the highest temperatures, but in the light of these figures one would certainly expect the tar from some plants to be, at least in part, of the ordinary high-temperature type.

The special danger of producer-gas tar would seem to be that the workers are exposed to its vapor; this is not the case with workers coming into contact with other tars. The practical importance of this matter is sufficient reason for quoting here the description given by Lewes (11, p. 135) of the minute appearance of the vapor of gas-works tar: "If coal gas as it leaves the mouth of the retort be allowed to escape through a pet cock, it will be seen to be of a brown colour, and if a piece of white paper be held in the stream of escaping gas it rapidly becomes brown from condensing tar vapour, while if the temperature of the retort has been pressed to the highest possible point the gas will show greyish-black from separated carbon. The brown vapour is formed of myriads of microscopic vesicles filled with coal gas, the envelope being tar, and owing to their lightness they continue to float in the stream of gas until friction or the dashing against some solid body causes them to burst, when the gas is liberated and the condensed tar streams down the surface of the body on which the vesicle has been wrecked." If the skin were exposed to any such vapor, the tar would be brought into the most intimate contact with the minute folds and apertures. *It is clear that no tar-producing fuel should be used in any producer plant in which the stokers are exposed to the escaping fumes; anthracite or preferably coke should be used instead.*

Scottish Shale Oil

The cancer-producing power of this oil is shown both by the industrial evidence, for which the chief authority is now the monograph by Scott (49), and by the experimental investigations of Leitch (50). Here it is only necessary to consider such information as is available concerning the temperature to which the oil has been exposed, and its chemical composition; the data given are taken chiefly from Beilby (51), Steuart (52), and Scheithauer (6), and from information obtained through the kindness of Mr. E. M. Bailey, Chief Chemist at the Pumpherston Works.

The retorts in use in the early days of the industry were very similar to horizontal gas-works retorts, and at a somewhat later date vertical retorts were introduced also. It is evident from the lively description by Beilby that these retorts were very strongly heated, but no exact temperatures can be stated. Hence, the oil responsible for the cases of cancer reported by Joseph Bell and others between 1876 and 1883 (see references given by Leitch (50)) must have been heated to a

high temperature; and one can infer this also from the fact that it was a great innovation when Young in 1868 to 1869 lowered the retort temperatures in some experimental vertical plants to a "low-red heat" (? 450° C.) and obtained thereby an increased yield of paraffins. This oil, obtained at "a very dull red, scarcely visible in daylight," contained 10 to 11 per cent. of paraffin scale; whereas the oil from the old strongly heated retorts contained only 7 per cent. Young's retorts were not fitted for management by workmen, and did not come into general use; but in 1874 Henderson produced a practicable retort also working at the lower temperatures, and in the subsequent years many such retorts were built, while at the same time many of the existing retorts of older types were modified for use at these temperatures. There must, therefore, have been a period in the industry when a good deal of oil was produced at comparatively low temperatures.

In 1881, however, the vertical retort of Young and Beilby was introduced. This was adopted throughout the industry, so that by 1897 three-fourths of the retorts in use were of this type, and at the present day all the retorts are modifications of it giving the same conditions of temperature. The action is continuous, the shale passing through the retort in about thirty hours. Measurements of temperature made recently *within the mass of shale* in the retort have given the following results:

Temperature °C.	*Duration of Heating* *hrs.*
Rising to 510	17
510 to 704	8½
at 704	4½
Total	30

In the upper part of the retort during the long period in which the temperature is rising to 500° C. the shale is practically freed of oil without decomposition of the paraffins; in the lower part the residue is heated in a current of steam to a temperature of 700° or rather higher, which is just below its fusing point. The first stage of this process yields more paraffin, and the second more ammonia, than did the older method.

A temperature of 700° is, in comparison with the retort temperatures of gas-works, rather low. One may note in passing that Dr. Leitch's experiments upon series of mice show that shale oil is distinctly less active in producing cancer than are most samples of gas-works tar. The exposure is, however, a long one (four and one-half hours), and throughout it the shale itself is kept at this temperature. During this time such changes as have been detected experimentally at about 750° C. (described under "Types of Chemical Reaction," below) perhaps begin to take place. In laboratory experiments it has been found that shale can be exhausted completely of oil at temperatures below 540° C. so that no appreciable amount of oil is obtained by heating to higher temperatures. But it seems possible that some other organic product may be formed in the lower part of the retort, perhaps in very small amounts, and be carried over with the steam and ammonia and extracted from the mixed watery and oily distillates in the condensers chiefly by the oil.

A list of the compounds stated in the literature ((6) (52), and other references below) to be present in Scottish shale oil will not require much space.

Paraffins from CH_4 to $C_{30}H_{62}$ at least.
Olefines.
Naphthenes, including hexa-methylene.
Methyl-tetra-methylene, penta-methylene.
Benzene.
Toluene.
m-Xylene.
Pseudocumene.
Pyrene.
Chrysene.
Phenol, α-cresol and *m*-cresol, xylenols, some higher phenols, guaiacol (53).
Pyrocatechin.
Pyridine, α-picoline, four dimethyl-pyridines and one trimethyl-pyridine (54).
Quinoline and seven methyl-quinolines from $C_{10}H_9N$ to $C_{16}H_{21}N$ (55).
Sulphur compounds.

Quinolines containing more than two methyl groups have not been isolated from coal tar. Heusler (quoted by Steuart (52)) found naphthalene to be

absent from the fraction of the oil boiling below 110°.

Of the sixty-five cases of epithelioma occurring among shale oil workers from 1900 to 1921 inclusive (49), forty-five were in men whose occupations (laborer, stillman, retort-man, engineman, ammonia maker, oil refiner, or oil worker, coal trimmer, plate layer, shale breaker) do not bring them especially into contact with the fraction richest in paraffin; nineteen were in paraffin pressmen, who are exposed continually to a saturated solution of the solid paraffin in oil; and one case only occurred among the sweating-shed men, who carry out the final heating and filtering of the refined paraffin. If the higher paraffins produced cancer, one would expect the sweating-shed men to be the most liable to it. It may, of course, be said that the paraffins produce cancer in conjunction with other constituents of the oil; and this is the kind of statement which cannot be contradicted, for no shale oil workers are exposed to materials free from paraffin. Probably it is not possible to ascertain whether the period of prevalent low-temperature distillation in the seventies and eighties had any effect upon the incidence of cancer among the men, for (1) the number of cases is at most small; (2) there is no systematic record of the number of cases occurring prior to 1900, from which year onward a complete list has been compiled by Scott; and (3) the long and variable latent period of these forms of cancer introduces a further difficulty.

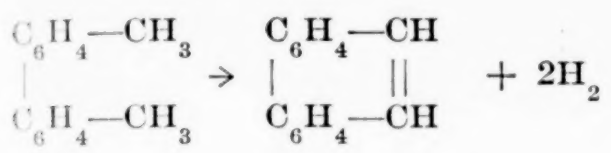
Types of Chemical Reaction Likely to Occur at the Higher Retort Temperatures

The controlling influence of temperature upon the composition of a tar is shown most clearly by the conversion of a low-temperature tar into a high-temperature tar by heating; thus Pictet (56, p. 325)[9] passed his vacuum tar, an extreme example of the former class, through an iron tube at cherry-red heat, and obtained a typical high-temperature tar containing substances (benzene, toluene, xylenes, phenols, naphthalene, anthracene, pyridines) which were not present in the original tar. This production of aromatic from aliphatic compounds by heat is well known in the petroleum industry, and has been the subject of many patents (see (10, pp. 185-195)); thus the distillation residue of Galician petroleum contains many substances, not present in the original oil, which are characteristic constituents of high-temperature gas-tar—anthracene, phenanthrene, pyrene, retene (57).

Burgess and Wheeler (26) found that all coals (bituminous and anthracitic) show a well-defined decomposition point between 700° and 800° C. when a sudden and large increase (nearly threefold in some cases) occurs in the amount of hydrogen evolved per gram of coal. This increase was observed also in the experiments of Taylor and Porter (58). Burgess and Wheeler suppose that this hydrogen arises from the decomposition of paraffins. Jones (22), in studying the changes produced by heating the low-temperature tar prepared by himself and Wheeler (see under "Gas-Works Tar"), observed a similar sudden increase in the evolution of hydrogen at 750° C. At the same temperature naphthalene appears, the evolution of gaseous olefines, which reaches a maximum at 550°, practically ceases, and there is a sharp fall in the amount of methane formed. This author supposes that at the higher temper-

[9] This is a useful summary by Pictet of his numerous investigations published in other journals.

ati es the olefines condense to form aromatic compounds, and that "the increased production of hydrogen must probably . . . be attributed to the union of aromatic molecules, and to the intramolecular closing up of side-chains and rings of these to form new rings." As an example of one of these latter processes he refers to the conversion of *o*-ditolyl into phenanthrene by passage through a red-hot tube:



A very interesting example of the formation of aromatic compounds from an olefine is provided by the experiments of Staudinger, Endle, and Herold (59); they passed the di-olefine isoprene, $CH_2=C(CH_3)-CH=CH_2$, through a tube heated to various temperatures from 430° to 800° C. At 750° the products included benzene, toluene, naphthalene, and methyl-naphthalene, anthracene, phenanthrene, and chrysene; at lower temperatures these aromatic compounds were not found, while at 800° they made up practically the whole of the products. In similar experiments with 2-3 dimethyl butadiene, $CH_2=C(CH_3)-C(CH_3)=CH_2$, benzene, toluene, naphthalene, and anthracene were formed at 750°, but were not formed at 700°. Zanetti (60) obtained the following products by heating to various temperatures a gaseous petroleum fraction consisting chiefly of the paraffins, propane and butanes: (1) *unsaturated compounds* (chiefly ethylene and butenes) which reached a maximum at 750° C. and then decreased; (2) *hydrogen* which began to increase at 750°, the increase becoming more rapid at 825°; (3) *aromatic compounds* of which benzene, toluol, and naphthalene were identified; these began to appear at about 750° C. Thus a liberation of hydrogen and formation of ring compounds coincided with a diminution of olefines.

These four different investigations agree, then, in showing that certain chemical reactions become prominent under laboratory conditions in the region of temperature between 700° and 800° C. These reactions consist in the decomposition of olefines and the formation of aromatic compounds, with evolution of hydrogen.

Summary of Part I. The Composition and Cancer-Producing Power of Lignite Tar, the Coal Tars, and Shale Oil, and the Effect of Retort Temperature upon These

1. A comparison has been given of the composition of the gas-works tars which have undergone more (horizontal retort) and less (vertical retort) exposure to the retort temperature (900° to 1,000° C.); in Deelman's experiments the tumors produced by the former tar were found to become malignant more rapidly than did those produced by the latter. A repetition of these experiments is required in which tars are used which are known to be derived from one and the same sample of coal.

2. The lignite tar which was the cause of the first cases of tar cancer to be described was a high-temperature tar; whether the modern lignite tar, which is produced at lower temperatures (not above 600° C.) also has this property is uncertain, since no records of cases of cancer due to it have been found in the literature.

3. Blast-furnace tar is formed, at any rate in large part, at comparatively low temperatures, and it has the chemical characteristics (presence of solid paraffins, abundance of phenols other than carbolic acid, deficiency of other

aromatic compounds) of low-temperature tars. It does not produce cancer, but we have no proof whether this is due to the temperature at which it is formed, to the nature of the coal (splint coal) from which it is derived, or to some reaction dependent upon the mineral substances present in a blast furnace.

4. Shale oil is obtained by exposure of the shale to temperatures which are, during many hours, at or near 700° C. The oil produces cancer, but is in this respect less active than gas-works tar.

5. With regard to producer-gas tar and coke-oven tar more data are needed. We know that the tar from certain producers causes cancer, but we do not know the temperatures in these producers. Coke-oven tar is formed at fairly high temperatures, but we have no direct proof that it can cause cancer.

6. Producer-gas tar cancer could in all probability be prevented by the use of coke or anthracite in those plants in which the stokers are exposed to the escaping fumes.

7. Important chemical changes, consisting in the decomposition of olefines and the formation of aromatic compounds, become prominent in the region of temperature between 700° and 800° C.

8. Further investigation is required in order to decide the influence of retort temperature upon the cancer-producing power of tars.

Part II

The Fractions of Gas-Works Tar

The seven fractions which are produced by the ordinary commercial distillation of coal tar are stated in Table 1. In this table an attempt is made to indicate the relative amounts of the different fractions, and the temperatures between which each fraction is produced. The figures given are, of course, only very rough, for the practice varies considerably in different tar-works, and also in the same works in accordance with fluctuations in the market for different products. Thus the proportion of creosote oil produced may vary from 9 per cent. to 25 per cent. of the crude tar. Again, a hard, medium, or soft, pitch, amounting to from 50 to 80 per cent. of the tar, may be produced by regulating the amount of anthracene oil distilled off from it. The figures in the table are derived from those given by Warnes (13).

TABLE 1.—FRACTIONS OF GAS-WORKS TAR

Fraction	Per Cent. of Tar	Upper Limit of Temperature in Still °C.
Ammoniacal liquor	2	180
Crude naphtha	2	180
Light oil	9	225
Middle or carbolic oil	5	255
Creosote oil	14	275
Anthracene oil	3	320[1]
Pitch	65	

[1]Steam distillation.

The anthracene oil is the only one of these fractions the further treatment of which by the tar-distiller must be described here. Anthracene oil contains a quantity of crystalline material in suspension. These solids, which amount to about 5 per cent. by weight of the oil, are separated from the oil by centrifuging or filtration, and constitute "40 per cent. anthracene." The oil is now known as green, strained, or dead oil. It is used for the manufacture of "grease" (see below) and for other purposes. The green oil is of course a saturated solution of the crystalline substances removed. The 40 per cent. anthracene is washed with solvents in

which anthracene is not very soluble, and by this means is converted into "85 per cent. anthracene." The material removed in this way, which consists chiefly of carbazole and phenanthrene, with acridine and of course many other substances, will be spoken of here as *anthracene residue.*

The relationships of the derivatives of tar which must be dealt with in this section may be represented by the scheme shown in Figure 1.

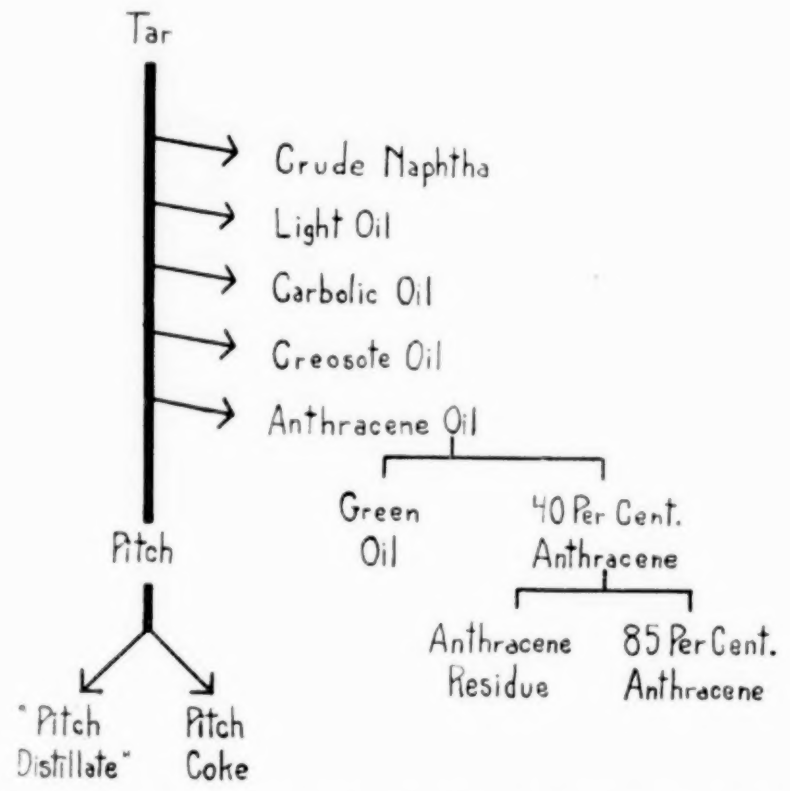


FIG. 1.—Relationships of the derivatives of tar.

THE CANCER-PRODUCING POWER OF THE VARIOUS FRACTIONS OF COAL TAR

The question then arises, into which of these fractions does the cancer-producing substance present in the original tar pass?

Cancer similar to tar cancer has been recorded in workers handling (*a*) creosote, (*b*) green oil, (*c*) 40 per cent. anthracene, and (*d*) pitch; and experimentally cancer has been produced by a high-boiling distillate from pitch which is not prepared commercially. One may now consider in detail the industrial and experimental evidence in the case of each fraction; when no other source is stated the experimental evidence is derived from investigations carried out in this Institute. There are first one or two points to be noted with regard to the industrial evidence in general.

Evidence from the Incidence of Industrial Cancer

The incidence of epithelioma upon the workers handling the different fractions can give qualitative, but not quantitative information upon this question. One can apply creosote oil and green oil to different series of mice in an exactly similar manner; but one can be quite sure that the men who pickle timber in creosote, and the men who make "grease" from green oil, will not be exposed to these two agents to exactly the same extent. Hence a higher incidence of industrial cancer does not prove that the fraction of tar concerned contains the cancer-producing substance in especially high concentration. The qualitative value of the evidence from these sources, however, is very great. Where only very few cases of epithelioma are recorded in those working with a particular substance, one must, of course, consider the possibility that the disease has arisen independently of the occupation.

In reports of cases of occupational cancer it is very desirable that the substances with which the workers come in contact should be described as fully and accurately as possible. In conditions such as mule-spinners' cancer, for instance, it is evidently of the greatest importance to know the exact source of every one of the oils which may be responsible. The literature relating to the tar cancers contains many vague and inaccurate expressions, such as "paraffin, etc." or "hydrocarbons of the petroleum series" (!). The degree of accuracy which is considered suffi-

cient in reporting cases of occupational cancer is shown very well by a passage in the thesis by Scott (49), who examined the records of nearly a quarter of a million hospital admissions: "In examining the records of Edinburgh Royal Infirmary for the past twenty-two years, numerous cases have been recorded as paraffin cancer among railway workers, dock labourers, masons, chimney sweeps, glass makers, enginemen, etc., in none of whom was the condition likely to have been due to paraffin."

The Fractions of Low-Boiling Point (Naphtha, Light Oil, Carbolic Oil)

Industrial evidence appears to be almost wholly negative. Many of the substances contained in these fractions are present also in blast-furnace tar (toluene, xylene, trimethyl benzenes, cresols, xylenols). Ball (61) reported that workers in a carbolic acid factory showed numerous warts—"one man, whose duty it was to fill the bottles with pure carbolic acid, had his hands covered with them." It is not clear whether these people came into contact also with the *crude* carbolic oil fraction or other tar products; no cases of cancer among them were reported. Story (62) described the case of a workman who received a splash of "crude carbolic acid" on the eyelid. At the spot a wart of the type familiar to carbolic acid workers developed, which in the course of a few months became an epithelioma. This was excised and examined microscopically. Possibly the cancer in this case was of the type which occurs sometimes in scars, and was independent of the chemical nature of the injury.

Experimental evidence with regard to this and the next fraction (creosote) may be taken together. Bloch and Dreifuss (63) refer to experiments in which mice were painted with "the fraction of low-boiling hydrocarbons:" they do not state any limits of temperature, but it is evident that some fraction boiling below 300° is meant. Whether this vague term is intended to include the creosote must be left uncertain. The fraction produced tumors which ulcerated late and were as a rule non-malignant in character. There was a considerable development of the stroma and blood vessels, so that such tumors might be given the name "strongly vascularized benign fibro-epithelioma." In a later paper (64) Bloch says that the cancer-producing substance is found in some tars at lower levels of boiling point than in others. Jordan (65) found all the fractions of tar boiling below 300° to be so toxic for mice that no tests could be carried out.

In this Institute we have obtained negative results with xylene (boiling point about 136° C.); and we can exclude the constituents of "90 per cent. benzol" (*i.e.*, benzene, toluene, xylene) which has been used as the solvent for several substances (*e.g.*, acridine, phenanthrene) which have given negative results in tests of nine months' duration. Apparently no conclusive experiments have been made with the creosote fraction alone.

Creosote Oil

Industrial Evidence.—Mackenzie (66) recorded the case of a man, engaged in treating timber with creosote, on whose scrotum were several papillomata "from the size of a pea to that of a nut." Apparently this author had met with other such cases in creosote workers, in one of whom a similar tumor became an epithelioma, and was excised. Unfortunately this second case is only vaguely described, and it is not quite clear whether the man worked with creosote or with tar. Legge (67)

ecorded cases of eczematous eruptions of the forearms in men using creosote to lubricate die-moulds in a brick-works. In one old man an epithelioma developed on the forearm, and was excised. In the following year one case of epithelioma and one case of severe ulceration of the forearms and hands were reported to the Home Office from a "creosoting factory" (68). O'Donovan (69) described cancer in three men employed in creosoting timber; the occupation of a fourth is described only by the words "pickles telegraph poles," no substance being named, but in all probability this was creosote. In three of these men the cancer was on the scrotum, while the fourth man had one cancer on the lip and three on the arms.

Anthracene Oil and Green Oil

Industrial Evidence.—Green oil, and sometimes creosote also, is mixed with rosin and lime to make lubricating greases. "Usually the composition varies between 86 to 88 per cent. of heavy oil, 4 to 7 per cent. of rosin oil, and 4½ to 6½ per cent. of slaked lime, the remainder being water" (13, p. 196). Heat is evolved when the lime is added to the oil, and the arms of the workmen are often splashed by the hot liquid. Oliver (70) described two cases of epithelioma of the arm among greasemakers, one of which ended fatally. Unfortunately the material used is described only as "oil distilled from coal" but in all probability it was green oil or creosote or both of these. Legge (71) in describing an examination of the workmen in eight oil and grease works where "coal or anthracene oil" was used says, "One man using grease in the filling of brattice cloth was found with extensive ulceration of the arm and a scar marking the place where an epithelioma had been removed." Dr. Legge informs me that no cases of epithelioma caused by grease have as yet been notified to the Home Office (*i.e.*, from January, 1920, to the present date). These records are sufficient to show that the practice, common in some tar-works, of removing tar from the skin with heavy oil (72) is not free from danger unless the oil is afterwards removed completely.

Experimental Evidence.—Both anthracene oil and green oil are very toxic to mice; during the earlier weeks of application they were therefore diluted with lanolin. In the anthracene oil series, a papilloma which appeared after 150 days developed into an epithelioma penetrating to a considerable depth; the series yielded also five papillomata, one of which showed early downgrowth. The green oil series yielded a papilloma and another tumor which reached a large size and was in all probability malignant; unfortunately this mouse was eaten by its companions. The number of mice surviving in the later months (three after six months in each series) is too small to allow one to draw any conclusions as to the relative potency of the two oils. Jordan (65) failed to obtain tumors of any kind by the application of anthracene oil to mice.

40 Per Cent. Anthracene and Anthracene Residue

Industrial Evidence.—The only cases recorded in this country of epithelioma due to crude anthracene seem to be those described by O'Donovan (73). Three men engaged in handling 40 per cent. anthracene in an alizarine factory developed epithelioma on the hand, cheek, and wrist respectively. One of the three had previously been a pitch-breaker; of the two others, one had worked for thirty years and the other for thirty-two years with the crude anthracene,

and these two had never worked with any other tar-product. Of the twenty-five men employed in the factory, those dealing with the purified anthracene were free from the skin lesions (acne, keratoses, telangiectases, and pigmentation) which affected those in contact with the crude material. Leymann (47) mentions three workers in the anthracene department of a German chemical factory who had to undergo operation for tumor of the scrotum, but he gives no further information.

Experimental Evidence.—Forty per cent. anthracene was tested upon two series of 100 mice. Series A received a suspension in lanolin, and showed no tumors, although forty-five mice lived more than six months. Series B received an ethereal extract. After 131 days when forty-four mice were alive, one mouse developed a papilloma, which later bore a long horn. No other tumors appeared. An ethereal extract of *anthracene residue* produced no tumors. This test was not very satisfactory, as only six mice out of 100 lived more than 160 days. But it seems clear that *the cancer-producing substance is not concentrated among the solids in suspension in anthracene oil.*

Pitch

Industrial Evidence.—Of the ninety-five cases of epithelioma notified to the Home Office from England and Wales between January, 1920, and June, 1922, sixty-six were in pitch workers (46). Many writers have described the conditions under which the pitch-breakers and the briquette-makers work, and the affections of the skin which they show [Legge (71), Warnes (13), Ehrmann (74) and others], so that it is unnecessary to give any account of the matter here. Probably pitch cancer could be almost wholly eliminated if one of the systems now in use in some works in Holland and Germany (47) (75) could be adopted. Thus in the Fohr-Kleinschmidt system the liquid pitch can be run off from the tar-stills into tank wagons and conveyed to a briquetting plant, where it is converted in a closed apparatus, which is patented, into a fine dry powder. This is mixed with the coal dust in a closed drum. Thus the work of the pitch-breaker at the gas-works is abolished altogether, and the briquette-makers are not exposed to pitch-dust.

Experimental Evidence.—Pitch was applied to two series of 100 mice. Series A received a suspension of pitch in melted lanolin (3 gm. in 10 c.c.); the first tumors appeared after 182 days, when there were twenty-seven mice surviving. Between the 182nd and 294th days nine tumors appeared which were examined microscopically. Of these three were papillomata, two showing considerable downgrowth, while the remaining six were typical epitheliomata. Series B received the filtered solution from pitch (3 gm.) in 90 per cent. benzol (10 c.c.). This produced papillomata very quickly, the first appearing on the 64th day. This preparation was far more toxic than the other. After eighty days there were twenty-eight mice, and after 150 days two mice, remaining. Two tumors were examined, one being a papilloma with some downgrowth and one an early carcinoma. Jordan (65) also has produced cancers by means of a solution of pitch in benzol.

"Pitch Distillate"

Experimental Evidence.—When pitch is heated in an iron retort, the first distillate which comes over is greenish-black and greasy, like anthracene oil. If the temperature is raised to 490° C. (bulb of thermometer in liquid) the dis-

tillate becomes yellowish, and at this time a gas usually ignites at the nozzle of the retort. At 510° a clear orange-yellow liquid, having no resemblance to anthracene oil, comes over, which solidifies to a reddish material rather like sealing-wax. This liquid continues to distil over till 550° is reached; the residue in the retort is then a very hard coke. A solution of the red solid in 90 per cent. benzol, in which it is almost wholly soluble, was used for application to 100 mice. After eighty days, when twenty-eight mice remained, several papillomata appeared. Of seven specimens examined, four showed papilloma, and of these one showed considerable downgrowth. One of the other specimens showed a perfectly definite epithelioma. *The cancer-producing substance is then present in a fraction distilled above 500° C.*

Summary of Part II. The Distribution of the Cancer-Producing Substance among the Different Fractions of Gas-Works Tar

To summarize the data given in this section, one may say that, from the industrial evidence alone, the cancer-producing substance is present in the higher boiling fractions—namely, creosote oil, anthracene oil (and hence in the green oil and crude anthracene), and pitch. The experimental evidence supplements this by showing that it is not concentrated in the solids suspended in anthracene oil, and that it is present in the highest boiling distillate obtainable from pitch. Hence it may distil over through an interval of temperature extending roughly from 250° (the creosote fraction) to over 500° (the "pitch distillate")—that is, over a range of 250° C. or more. It must be admitted that this wide range has never been determined by experiments with fractions from one and the same sample of tar. According to Bloch (64), in some tars the cancer-producing factor is absent from all fractions boiling below 400°.

Part III

A Comparison of the Composition of Coal Tars, Lignite Tar, Shale Oil, and Petroleum, with Special Reference to the High-Boiling Compounds

Since cancer is produced by gas-works tar, lignite tar, shale oil, and at any rate some forms of petroleum, one naturally inquires what substances are common to all these liquids; and one may inquire further, since blast-furnace tar is innocuous and the evidence points to the comparative feebleness of crude petroleum in this respect, what substances are absent from or less abundant in these two. With this object in view, a list as complete as possible was compiled of the compounds present in each of these liquids. The data were set down in five parallel columns so that one could see at a glance what was the known distribution of any particular compound. The authorities used were chiefly Lunge and Spielmann for coal tar, and Scheithauer for lignite tar and shale oil, with Steuart also for the latter; for petroleum, Höfer's book (57) was found more useful than any other.

This piece of work obviously had to be carried out, but the result was not very satisfactory. The chief difficulties were as follows: (1) because a given compound has not been demonstrated in, say, shale oil, one can by no means assume that it is not present; (2) we have very little information about the composition of blast-furnace tar and of shale oil; (3) many of the statements about lignite tar refer to the modern

product, and it is not certain whether this produces cancer; (4) the whole subject of petroleum is made difficult by the great number of different kinds of oil, differing widely in composition, and by the scantiness of the information available about many of them.

Attention was then directed especially to the compounds with high boiling points, for it seems clear from the facts given in Part II of this paper that the cancer-producing substance must be sought among these. As an arbitrary lower limit, a boiling point of 270° C. (roughly the temperature at which the distillation of anthracene oil is begun) was chosen, and a separate list was made of all the compounds known to be present in gas-works tar which boil at or above this point. This list is given in Table 2. The compounds marked X have been tested for cancer-producing power with negative result. There may also be present traces of the higher paraffins; those having more than 15 carbon atoms boil above 270° C. Apparently no members of the olefine, acetylene, or naphthene series having boiling points above 270° C. are known to occur in coal tar. The presence of picene in coal tar has not been established quite certainly.

One must now consider which of the compounds in the list are common to the other cancer-producing fluids, and to blast-furnace tar. The result of this inquiry may be given as follows: The only substances boiling above 270° which are stated to be present

1. in blast-furnace tar are the naphthols;

2. in lignite tar are picene and chrysene;

3. in Scottish shale oil are pyrene and chrysene, and the methyl-quinolines from $C_{11}H_{11}N$ on;

with some higher paraffins in each case. The literature does not seem to contain adequate proof of this identification of pyrene and chrysene in shale oil. According to Scheithauer, picene and chrysene come over in abundance in the later stages of fractionation of modern lignite tar and are deposited in solid masses in the condensers.

With regard to the petroleums, in some of them compounds boiling above 270° of the paraffin, ethylene, and terpene series are present; but apparently no substance included in Table 2 has as yet been shown beyond doubt to be present in any *unheated* oil. In the distillation residues on the other hand, such as those obtained by distilling Pennsylvanian oil in red-hot iron retorts, anthracene, phenanthrene, chrysene, and pyrene are present; and the same substances have been found in the Galician residues (Höfer (57, pp. 92-93) and Redwood (76, p. 319)).

The comparison of the composition of these four different liquids shows, then, that chrysene, picene, and pyrene are common to two or more of them. One may now state the experimental results, so far wholly negative, which these high-boiling substances have given in investigations carried out in this Institute. Each substance is tested upon a series of 100 mice, and the experiment is continued for nine months.

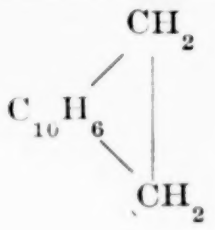
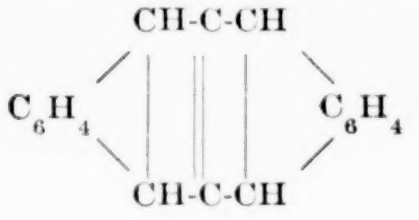
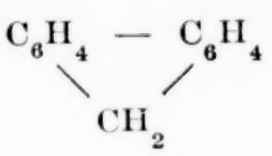
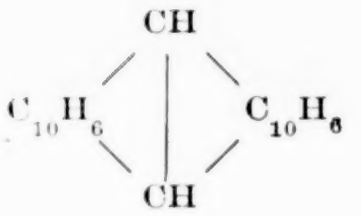
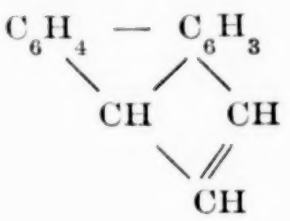
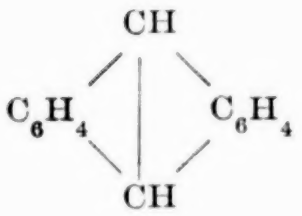
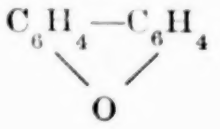
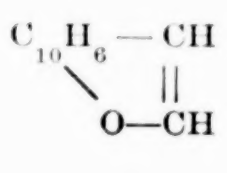
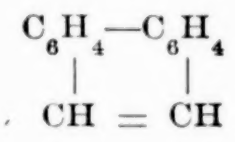
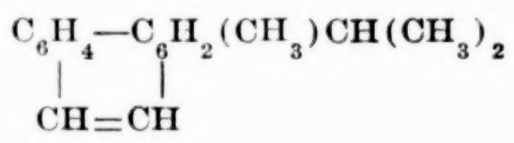
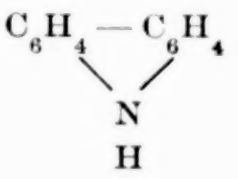
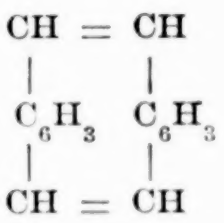
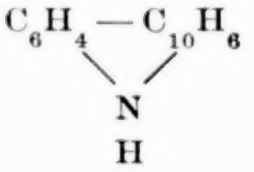
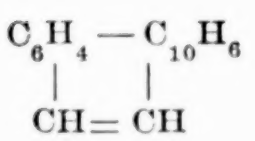
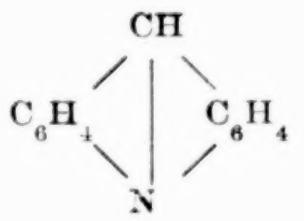
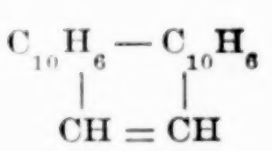
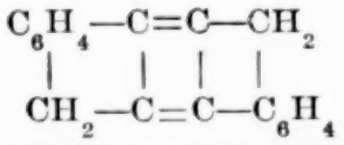
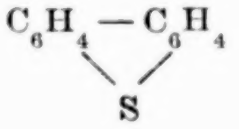
Chrysene (a 1 per cent. solution in warm 90 per cent. benzol of a preparation from Kahlbaum) has been applied at the present date for six and one-half months. This substance is distinctly toxic; only five out of the 100 mice are now alive. None of the series has shown any signs of a tumor. *Picene* and *Retene*. Dr. Chattaway of Queen's College, Oxford, has been so kind as to give his very pure preparations of these two hydrocarbons to be tested here. The experiments have been in progress for a few weeks only.[10] Apparent-

[10] *Note added at correction of proof:*

Picene and Retene have now been applied for seven months with negative results.

J. I. H.
April, 192

TABLE 2.—COMPOUNDS PRESENT IN GAS-WORKS TAR WHICH BOIL ABOVE 270° C.

Compound	Melting[1] or Boiling Point °C.	Compound	Melting or Boiling Point °C.
X Acenaphthene 	278	Naphthacene 	*335*
X Fluorene 	295	Naphthanthracene 	*171*
Fluoranthene 	250 (at 60 mm.)	Chrysogene	*280-290*
		Benzerythrene $C_6H_3(C_6H_5)_3$	*307-308*
X Anthracene 	360	Crackene $C_{24}H_{18}$	over 500
		Diphenylene oxide 	276
β-Methyl anthracene $C_{14}H_9CH_3$	above 360	β-naphthofuran 	284-286
Anthracene dihydride $C_{14}H_{12}$	305		
Anthracene hexahydride $C_{14}H_{16}$	290	α- and β-Naphthol $C_{10}H_7OH$	278 and 294
X Phenanthrene 	340	a-Dimethyl quinoline $C_9H_5N(CH_3)_2$	274
X Retene 	350	X Carbazole 	355
Pyrene 	above 360	Phenyl *p*-naphthyl carbazole 	*330*
X Chrysene 	430	X Acridine 	above 360
X ? Picene 	520		
X Truxene 	*365*	Diphenylene sulphide 	332

[1]The melting point is given in *italics*.

ly neither picene nor chrysene requires the higher retort temperatures for its formation, for they are obtained by the carbonization of lignite at 600° C. Retene is a derivative of phenanthrene. *Pyrene* has not yet been tested. This substance was first prepared in a pure state by Graebe (77) in 1871 from a high-boiling distillate from tar, which must have been similar to the pitch distillate described above, but so far no well-crystallized picrate which might be that of pyrene has been obtained from the pitch distillate.

Anthracene dissolved in olive oil gave a negative result. This is in agreement both with the fact that workmen handling purified anthracene do not suffer from skin lesions (see under "40 per cent. anthracene" above) and with the experiments of Fibiger (78) who failed to produce tumors in mice and rabbits by subcutaneous injections of suspensions or solutions of anthracene in oil. *Truxene* seemed to be of considerable interest; compounds allied to it, or truxene itself, have been thought to be important constituents of pitch (see Lunge (10, p. 532)). It was synthesized from phenylpropionic acid by the method of Kipping (79) and applied in solution and suspension in various mediums (lanolin, xylol, and 90 per cent. benzol) without result. *Phenanthrene*, *Fluorene*, and *Acenaphthene*, dissolved in 90 per cent. benzol, all gave negative results; the two latter are distinctly toxic. Acenaphthene is not present in some English tars. *Acridine* has often been suggested as the cancer-producing agent in tar, probably on account of its irritating effect upon the skin and mucous membranes. It was applied dissolved in lanolin in the one case and in 90 per cent. benzol in the other to two series of mice, *i.e.*, 200 in all. The only noticeable effect was that the health of these mice was especially good, so that an unusually large proportion lived throughout the nine months. This provides another illustration of the fact that "irritation" alone is not a means of producing cancer (cf. the chrome workers (46)). The formula of *Carbazole* suggested the possibility of establishing a connection between the forms of cancer affecting aniline workers and tar workers, but no effects upon the skin or bladder were produced by a 1 per cent. solution in alcohol. According to Bloch (64) the cancer-producing substance does not contain nitrogen.

The remaining substances in the list have not as yet been available for experiment. Of them one can exclude the naphthols, for they are present in blast-furnace tar. Crackene is a low-temperature product; it can be obtained from coal by distillation below 500° (17), at which temperature it begins to decompose. The isolation of many of the substances in question is very difficult and they have been but seldom prepared.

In conclusion a few points about some other compounds and classes of compounds may be considered. *Naphthenes* are present in very small amount in gas-works tar (see under "High-Temperature Tar," above). They are present in specially large amounts (up to 80 per cent.) in Russian (Baku) petroleum; none of the very few cases of petroleum cancer of which we have been able to find records was due to Russian petroleum. The *Olefines* are present in very small amount in high-temperature tar, but more abundantly in Scottish shale oil; the only petroleum at all rich in them is the Californian, which has certainly not attracted notice as a source of industrial cancer. With regard to the *Paraffins*, the evidence derived from the lignite tar and shale oil industries has been given above; in these industries the workmen who have most to do with the most concentrated forms of paraffins are the least liable to affections of the skin. High-temperature coal tar, which, together with its pitch, produces far more cases of industrial cancer than do all other materials put together, is especially poor in paraffins, and contains less of them than does blast-furnace tar. The petroleums of Pennsylvania, Canada, Galicia, and Roumania contain especially large amounts (up to 85 per cent.) of paraffins, but are not distinguished by producing many cases of petroleum cancer. We have been able to learn of one case from the United States and of thirteen cases from Galicia. Prosser White (80, p. 143) says, "The writer has watched *women* and

girls employed all their working hours, year after year, bedaubed with refined paraffin wax free from impurities, none of whom have ever experienced the least trace of inconvenience or distress." Weidman and Jefferies (81) have given a valuable summary of the results of subcutaneous injection of paraffins in man and in monkeys; the type of lesion observed so far "is a foreign-body granuloma, and in no sense of the word neoplastic." It is unfortunate that the idea that paraffins cause cancer should be encouraged by the use of the term "Wax Cancer" in the title of a paper ("Paraffinoma and Wax Cancer," by Davis (82)) which does not contain a description of even a single case of any condition which could be described as "Wax Cancer."

The evidence concerning *Carbolic Acid* has been given under "The Fractions of Low-Boiling Point," above. Many of the other *Phenols* are present in larger amounts in blast-furnace tar than in gas-works tar. *Naphthalene* seems to be excluded by its great volatility, which causes it to be present in the low-boiling fractions; by its presence in blast-furnace tar and in many petroleums; and by the fact that the men engaged in its manufacture show only negligible affections of the skin (80, p. 150). Bierich (83) produced cancer in mice once with pyrrol and once with benzidine; he tested twenty-seven other substances with negative results, but most unfortunately he does not name them. Our results with benzidine (saturated solution in alcohol) were wholly negative, with regard to both the skin and the bladder. Benzidine has not been found in coal tar. Bloch (64) finds that the cancer-producing substance is neither acid nor basic. Murray (84) has shown that if coal tar is extracted successively with water, alcohol, and ether, the ethereal extract is much more active in producing cancer than is either the tar or the other two extracts. The ether in such an experiment takes up about one-half the weight of the original tar. This result does not permit one to conclude that the cancer-producing substance is itself ether-soluble; it may be dissolved in the liquids of the tar which go into solution in the ether. Experiments with high-boiling fractions of ether extracts prepared by Murray's method are in progress in this Institute.

Summary of Part III

Thus the attempts made to find the cancer-producing substance among the known constituents of coal tar have given wholly negative results. It now seems not unlikely that the cancer-producing substance in tar is some compound as yet quite unknown, which is unstable and present in amounts as small as those of the hormones in the body-fluids or the vitamines in foods. As in the case of some hormones, its identification may be long delayed even when very concentrated preparations can be obtained. Those substances which are known to be present in coal tar have been isolated because they are specially abundant, or stable, or capable of forming well-defined compounds; the unknown substances are unknown because they have not these properties, and the cancer-producing substance may well be among them.

Summaries of the first two sections of this paper have been given above.

All the experimental work described above has been carried out under the direction of Dr. Archibald Leitch, to whom the writer is indebted for much advice and help in many matters dealt with in this paper. Invaluable mate-

rials and information have been received from Messrs. W. Gordon Adam, F. M. Potter, and N. E. Siderfin, of the Gas Light and Coke Company, and from Mr. W. Kirby, of the South Metropolitan Gas Company; without their help, which has been most readily given at the cost of much time and trouble, the work could not have been carried out. I wish to express my indebtedness also to Dr. T. M. Legge, Senior Medical Inspector of Factories, for information about many forms of industrial cancer; to Mr. E. M. Bailey, Chief Chemist of the Pumpherston Works, for the data obtained by him as to the temperatures in shale retorts; to Mr. D. R. Steuart, for literature on the composition of shale oil; to Mr. A. B. Searle of Sheffield, for information upon several points connected with tar and coal; and to Dr. Chattaway, for his kindness in supplying specimens of picene and retene.

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BOOK REVIEWS

HYGIENE AND PUBLIC HEALTH. By *Louis C. Parkes*, M.D., D.P.H. University of London, Lt.-Col. R.A.M.C. (Temp.), Consulting Sanitary Adviser to H. M. Office of Works; Late Civilian Sanitary Member of the Advisory Board for Army Medical Services; Medical Officer of Health of the Metropolitan Borough of Chelsea; Fellow of the Royal Sanitary Institute; and *Henry R. Kenwood*, C.M.G., M.B., F.R.S. Edinburgh, D.P.H. London; Chadwick Professor of Hygiene in the University of London; Medical Officer of Health and Public Analyst of the Metropolitan Borough of Stoke Newington and Medical Officer of Health for the County of Bedfordshire; Fellow of the Royal Sanitary Institute. Cloth. Seventh Edition. Pp. 783 with index. Philadelphia: P. Blakiston's Son and Company, 1923.

The appearance of the seventh edition of this work is welcome and indicates the rapid advances which have been taking place in the broad and general fields of preventive medicine. It is certainly evident that in the last few years new knowledge has been acquired on every side, and no manual or textbook can be considered in any measure adequate which does not undergo frequent revisions. In no field is this more true than in that of preventive medicine.

This edition, then, is another attempt to put before health officers, practising physicians, and others interested in conserving the health of the public, "the advances in Public Health and Sanitary Science that have taken place since the last edition was issued." Although the paper, binding, and printing make a creditable appearance, as in many works of this sort, judicious pruning should be resorted to more freely in certain chapters and much irrelevant material should be omitted, while in others a more comprehensive treatment would seem necessary to make this work a really adequate manual.

The book deals mainly with the hygiene of the environment (sanitation). There are, for example, sixty-five pages on air and ventilation, twenty-five on climate and meteorology, and thirty on disinfection, with descriptions of a multiplicity of apparatus and elementary physical principles that seem unnecessary. The section on ventilation is not very modern in certain respects, such as over-emphasis on the injurious effects of sewer gas, once a hygienic bugaboo, but now not seriously regarded by most sanitarians. There are other chapters in which American sanitarians will find little of service. Such subjects as heredity and eugenics, now regarded generally as important hygienic and sociological problems, are not considered. The chapters on water, disposal of refuse, foods, maternity and child welfare, and school hygiene, appear adequate and readable. The chapter on industrial hygiene and marine hygiene, although brief, is well written, with a consideration of the most important statutory regulations of Great Britain, the pioneer in legislation to protect the industrial worker. Particular attention is given to dust and fumes as a cause of disease, and also to occupational tuberculosis. The most important industrial poisons, together with sanitary precautions and welfare orders, are considered briefly. The various communicable diseases, their incidence, etiology, mode of transmission, diagnosis, prevention and control, are described in a brief manner. It appears that insufficient emphasis is placed upon diagnosis and the methods usually employed in public health laboratories.

No fault can be found with the authors' statement of our present-day knowledge of contagious diseases. The rôle of insects in disease, however, appears to receive insufficient attention. The historical or epidemiological side has not been developed. The problem of human "carriers" is considered. Special stress is laid upon the fact that most diseases are highly infectious in their early stages. This shows how imperative is the close co-operation of the practising physician and the health officer.

The book should make an appeal to those who want a short, concise statement of the most important facts, especially in regard to English practice and methods in public health.
—*G. Howard Bailey.*

NERVOUS AND MENTAL RE-EDUCATION. By *Shepherd Ivory Franz*, M.D., Director of Laboratories, St. Elizabeth's Hospital (Government Hospital for the Insane), Washington, D. C.; Professor of Psychology, George Washington University. Cloth. Pp. 221 and preface and index. New York: The Macmillan Company, 1923.

This new book by Dr. Franz—the author of the well-known "Hand Book of Mental Examination Methods"—was written mainly for

medical men not trained as specialists in the field, and is fairly easy reading. The author treats his subject in an authoritative manner, and the book is well worth reading by anyone interested in the treatment of patients disabled by nervous and mental diseases.

The book is divided into three parts. *Part I* deals with the "Basis and General Concept of Re-education." Re-education in its broadest sense is defined as a replacement of bad habits with better habits or the formation of new habits to replace habits which have been lost.

Part II discusses general re-education principles. It shows how habits are usually or normally formed from infancy up to adult life, and how a knowledge of these mechanisms assists in the development of a technic of re-education. The chapter on the measurement of performance is well written and is a practical, lucid account of methods successfully used in the professional work of the author.

In *Part III* one may profitably read chapters which treat the matter and technic of re-education more specifically. There are chapters on neurological and mental adjustments which are recommended for use in cases of anterior poliomyelitis, locomotor ataxia, cerebral palsy, speech defect, and psychosis. These chapters are particularly valuable to the physician who meets such conditions in his practice, as they approach and treat these subjects from a practical point of view, and give the physician definite, concise, and clear directions for carrying out the therapeutic measures recommended.—*Henry B. Elkind.*

Study of Workmen's Compensation Insurance Laws and Service: Monopoly or Competition with Recommendations by the Impartial Committee on Workmen's Compensation Insurance to the Cincinnati Chamber of Commerce. Edited by H. D. Martin, Medical Director, The Pollak Steel Company. Cloth. Pp. 1007 and index. Cincinnati, 1923.

Under the foregoing title have been published the results of an investigation made by the Cincinnati Chamber of Commerce, together with the resultant recommendations of a committee appointed by the Chamber to consider whether or not the Ohio Compensation Act should be changed or amended.

The volume sets forth the recommendations of this committee in the first thirty pages, the remainder of the book being given up to verbatim reports of testimony taken by the committee from a number of sources of information, including employers (particularly in Ohio), compensation commissions of various states, and representatives of various insurance companies writing compensation insurance. It is probably the most voluminous and detailed survey which has been recorded for public perusal. It is excellently indexed, and to anyone who is interested in the highly controversial subject of whether compensation insurance should be conducted by the state, by insurance companies, or by both state and insurance companies, will be found extremely valuable. From the standpoint of the readers of This Journal there is little of material value. Very little space is devoted to the question of medical treatment, and this space to the question of administration only. For a medical man, interested as he presumably is in the medical side of questions coming under compensation insurance, little, if any, information can be said to be contained in the voluminous reports of testimony which are set forth. For a person interested in the subject matter intended to be covered by the investigation of the committee, it will be found highly interesting, containing as it does such a full presentation of the various points of view upon that subject.—*William W. Kennard.*

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EDGAR L. COLLIS, M.D., M.R.C.S., Great Britain

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GENERAL

INDUSTRIAL HYGIENE. *H. A. Chisholm. Pub. Health Jour., Dec., 1922, vol. 13, pp. 529-535.*

This is a general article regarding the necessity of emphasizing industrial hygiene. The writer considers it a public duty to prevent industrial workers from unnecessary accidents and to compensate them for both accidents and occupational diseases. He points out that the annual death rate in Britain is only 12 per thousand, whereas in Canada it is 14 per thousand, despite the fact that the population is largely rural and that the rural death rate alone is not greater than that of Great Britain; the cause of the higher general rate in Canada must be sought in industrial centers.

The chief means of promoting industrial hygiene which the author recommends are:

1. Industry, assisted by the state, should arrange for medical examination, so that workers may be selected for the occupations for which they are fitted.

2. Physicians should report all cases of industrial diseases and accidents to the Health Departments which should investigate the relationship between the disease and its cause, and supply the Departments of Labor with information enabling them to correct the causes.

3. Legislation should enforce the foregoing recommendations.

4. Medical schools should devote more time to teaching the close relation of occupation and disease.—R. M. H.

DISABLING SICKNESS AMONG EMPLOYEES OF A RUBBER MANUFACTURING ESTABLISHMENT IN 1918, 1919, 1920. SOME MORBIDITY STATISTICS FROM THE DEPARTMENT OF HEALTH OF

THE GOODRICH COMPANY. *U. S. Pub. Health Rep., Dec. 15, 1922, vol. 37, pp. 3083-3092.*

Cases of sickness and non-industrial injuries causing absence from work from one full day up to one year among employees on the factory payroll were recorded and classified by the department of health of the B. F. Goodrich Company during the three-year period ending October 31, 1920. From the tabulation of these data made by the Equitable Life Assurance Society of the United States, this report was prepared and presented. The summary is quoted below.

The three years were unusual from the health point of view, and consequently the morbidity statistics of this period would not be representative of the sickness expectancy of the present time. The problem of reducing industrial morbidity to the lowest possible rate is not the same as the problem of reducing industrial mortality. Sickness disabilities were found to vary considerably by years, not only for specific diseases, but also in the total amount of time lost per person; but the chief causes of disability remained practically the same throughout the period under review. Disabilities were of shortest duration in the year ending October 31, 1918. The frequency of cases lasting longer than one week was greatest in the year ending October 31, 1919; in the following year occurred the greatest number of short-time disabilities—that is, those lasting less than one week. The beneficial effects of a well-organized industrial health department are reflected in the morbidity rates of employees according to length of service with the company and in the percentage absent each month on account of disability.—B. C.

INDUSTRIAL CONDITIONS UNDER THE GERMAN REPUBLIC. *A. Salomon. Welfare Work, Dec., 1922, vol. 3, pp. 225-227.*

This article, which is contributed by the director of the School of Social Studies, Berlin, sets out to show what the revolution has done for the working classes in Germany. Though the workers have certainly achieved political power it appears that they have not been able to reach their ideals of practical socialism in economic and industrial life. The influence and power of capital are stronger, and nationalization of industry is further away than ever before; the internal economic situation and the results of the Russian experiment quite account for this. Actually they have something of more real importance than nationalization—that is, better conditions of life, shorter hours of work, and a share in the responsibility of production.

The first fruit of the revolution was the eight-hour day in place of an unlimited day for men and of a ten-hour day for women. This was introduced by the provisional government in 1918, and included workers in all spheres. Difficulties were immediately apparent in connection with certain occupations, as, for example, agriculture, domestic service, and nursing. Agriculture has now special legislation, while domestic service and nursing are to be regulated on the principle of "preparedness," or being available, if needed, during a period of thirteen hours, with definite intervals for meals and rest. Regarding the effect on industry, there is everywhere a desire to take on overtime work or an extra job, in spite of strong trade union opposition to the principle; in some cases, both men and women follow a second occupation. The unions, with the help of factory inspectors, have blocked this tendency in some districts by arranging a two-shift system.

In regard to the effect of shorter hours on output, evidence is conflicting. Perhaps the most pronounced results are the establishment of thousands of small allotments of land around the cities and the avidity with which the workman and his family have taken to rearing vegetables. As may be conceived, the results have not been so gratifying with the younger generation which leans toward amusement, though a considerable interest has been aroused in games and sports.

Next in importance to the eight-hour day are the law-making Works Councils which are compulsory in factories, shops, and offices with more than twenty employees. No issue has been so violently contested in Germany; the workers as well as the employers are divided in their opinions of the question. The bill became law in 1920 and gave the workers a share in the control of production and business management. These councils have the control of the wage tariffs; they safeguard the right of the workers to combine; they are required to prevent strikes and lockouts; they are entitled to send two delegates to the board of directors and to have the balance sheet laid before them; they give general directions regarding the engagement of new workers, and take part in decisions of dismissal; they control welfare work, health arrange-

ments, and matters affecting working conditions. The work of the councils appears to have centered more around labor problems than around those of management and production; indeed the former eagerness to share control may be said to have disappeared.

Trade unionism has received a great stimulus under the new régime but welfare work has received a distinct setback. The German worker is hostile in principle to welfare schemes put forward by employers and carried out by people of a different social class. The revolutionary government has been extraordinarily productive of labor legislation. —W. F. D.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

Gas Warfare. Effects of Poisonous Gases—Early and Late. *W. R. Galwey. Abstr. as follows from U. S. Naval Med. Bull., 1922, vol. 17, pp. 230-242, in Chem. Abstr., Feb. 10, 1923, vol. 17, p. 436.*

The gases used are classified by their actions into the following six groups: lachrymators; sensory irritants of the eyes, nose, and upper respiratory passages; vesicants; asphyxiants or acute lung irritants; direct poisons of the nervous system; and gases which act by interference with the respiratory property of the blood. The action of these gases upon the tissues and the symptoms produced are described with much detail.—P. D.

Gas Masks in Chemical Plants. *I. V. Kepner. Nat. Safety News, Jan., 1923, vol. 7, p. 31.*

The various types of breathing apparatus in use prior to and since the world war are discussed. Since the war various manufacturers have perfected the air-purifying contents of the canisters used with the Tissot gas masks in order to give adequate protection against almost any toxic gases in the air.

Tissot gas masks, without absorbent canister and attached to 25 to 50 feet of non-collapsible hose with funnel at one end and held in pure air, are universally used when cleaning out confined spaces containing deadly vapors.—R. M. T.

Carbon Monoxide Poisoning. *A. Girault and A. Richard. Abstr. as follows from Presse méd., 1922, vol. 30, pp. 556-557, in Chem. Abstr., Feb. 10, 1923, vol. 17, p. 434.*

Carbon monoxide poisoning was followed by gangrene and retention of urine and feces.

Occupational Poisoning by Benzene. *Faure-Beaulieu and Lévy-Bruhl. Abstr. as follows from Bull. Soc. méd. d. hôp., Nov. 10, 1922, vol. 46, p. 1466, in Jour. Am. Med. Assn., Jan. 6, 1923, vol. 80, p. 65.*

Faure-Beaulieu and Lévy-Bruhl describe a severe anemia with hemorrhagic purpura and metrorrhagia in a woman employing benzene in her work. The patient showed also transitory signs of an affection of the spinal cord. They believe that similar symptoms occurring after injections of arsphenamin may be due to the benzene in the drug. Legislation should enforce sufficient ventilation of the rooms where benzene is employed.

Benzene Anemia. *Faure-Beaulieu and Lévy-Bruhl. Abstr. as follows from Bull. Soc. méd. d. hôp., Nov. 24, 1922, vol. 46, p. 1543, in Jour. Am. Med. Assn., Jan. 20, 1923, vol. 80, p. 213.*

Faure-Beaulieu and Lévy-Bruhl report a case of anemia due to professional contact (inhalation) with benzene of the highest purity.

Benzene Erythema. *G. Milian. Abstr. as follows from Bull. Soc. méd. d. hôp., Nov. 3, 1922, vol. 46, p. 1441, in Jour. Am. Med. Assn., Dec. 30, 1922, vol. 79, p. 2255.*

Milian describes a case of symmetric erythema of extremities in a man habitually working with dyes dissolved in benzene. Some tests showed that the epidermis of the patient was hypersensitive also to the application of cold. Milian believes that it was due to an alteration of sympathetic centers of the cord by syphilis.—K. R. D.

Tetrachlorethane Poisoning. *N. Fiessinger and M. Wolf. Abstr. as follows from Ann. de méd., Oct., 1922, vol. 12, p. 269, in Jour. Am. Med. Assn., Dec. 16, 1922, vol. 79, p. 2119.*

Fiessinger and Wolf remark that arsphenamin jaundice is so frequent today that not a week passes in an active hospital practice without encountering it. They have recently been studying two cases of toxic jaundice, one fatal, for which tetrachlorethane, in the manufacture of artificial pearls, was manifestly responsible. In these and other cases cited, the first symptoms were fatigue, nausea, headache, constipation, sometimes vomiting. The jaundice did not appear till the third or fourth day. The necropsy findings in their case are compared with the result of experiments on white mice. They all testify to the highly toxic nature of tetrachlorethane, and that the liver suffers first and foremost. Since 1915 toxic jaundice has been on the list of diseases to be declared to the British factory inspection service. In France this chemical has been abandoned in the making of aeroplanes. Treatment of the toxic manifestations is said to consist of the early and prolonged use of liver organotherapy, with abundance of sweetened beverages. Wilcox has emphasized the importance of alkaline treatment, giving about 2 gm. each of sodium citrate and sodium carbonate in a little water every two or three hours. This was supplemented with small glucose or sodium bicarbonate enemas. This alkaline treatment cured even in a case of trinitrotoluene toxic jaundice.—K. R. D.

Polyneuritis Due to Tetrachlorethane. *A. Léri and Breitel. Abstr. as follows from Bull. Soc. méd. d. hôp., Oct. 27, 1922, vol. 46, p. 1406, in Jour. Am. Med. Assn., Dec. 30, 1922, vol. 79, p. 2255.*

Léri and Breitel describe two cases of polyneuritis of long duration due to tetrachlorethane. The predominating symptom was a paralysis of the interossei of the feet and hands.—K. R. D.

Industrial Poisoning of Lead Burners. *Engelsmann. München. med. Wchnschr., Dec. 22, 1922, vol. 69, p. 1773.*

Examination of lead burners in two works in 1921 to 1922 showed that in one, twenty-two out of forty-one men had suffered from lead poisoning, five of them having two attacks. In the second, with about the same force, twenty-five had been ill, five of them with two attacks, one with three. Neither the appearance of stippled cells nor a rise in blood pressure nor a microscopic examination of the urine can be depended upon to give warning of a threatened attack. The diagnosis must be made on the clinical picture: a feeling of fatigue, especially in the knees, loss of appetite, sluggish intestinal movements, and then sudden colicky pains radiating from navel and stomach, and complete constipation.

Air analyses were made to determine the amount of lead that passed into the air in the course of lead burning. No less than 5.6 mg. were found in two analyses in 100 liters of air. Of forty-one burners who were examined, thirty-one always suffered from typical zinc poisoning (chills) immediately after they had welded zinc parts together.—A. H.

Lead Studies. II. A Critical Note on the Electrolytic Determination of Lead in Biological Material. *A. S. Minot. Jour. Biol. Chem., Jan., 1923, vol. 55, pp. 1-8. (Review by author.)*

In a method recently described by Denis and Minot for the electrolytic determination of lead in biological material, manganese is often present in the electrolytic bath and is deposited with the lead as dioxide on the anode. Manganese dioxide gives the reactions of lead dioxide in the subsequent steps of their procedure and frequently gives a positive test for lead when no lead is present.

In the Denis and Minot method there are losses of lead due, (*a*) to a solution of the precipitated sulphide during washing with 0.10 N hydrochloric acid, and (*b*) to an incomplete electrolytic separation.

The errors due to deposition of manganese and to loss of lead tend to balance each other and give roughly quantitative results.

Fairhall's chromate method for the determination of lead in biological material has been found to be much more accurate and practical than an electrolytic method.

Three Cases of Manganese Poisoning. *J. R. Charles. Jour. Neurol. and Psychopath., Nov., 1922, vol. 3, pp. 262-268.*

The author discusses the negative results up to the present time of the experimental production of manganese poisoning, and draws the conclusion that manganese ores ap-

pear to be nontoxic as a rule unless ingested by persons who have a personal idiosyncrasy.

The symptoms attributed to manganese intoxication are grouped. Emotional disturbances may be manifest with uncontrollable laughter or weeping, particularly at the beginning of the illness. Sometimes mental languor and lack of energy are prominent symptoms at the onset of the disease. This feeling is probably due to excessive exertion produced by the hypertonic condition of antagonistic muscles, involving excessive muscular work.

Quite early in the disease there is a tendency to retropulsion, or in some cases to propulsion. The gait then becomes spastic, with a peculiar tendency for the patient to step forward on the metatarsophalangeal joints—a feature so marked in one of the cases described that the patient, of his own accord, had had the heels of his boots raised for ease in walking, some time before he was examined.

Later the face wears a mask-like expression. The voice becomes monotonous, and increased salivation is noted. There may be general paresis of the muscles of the limbs, but without atrophy or reaction of degeneration.

Tremors of the head and limbs are common, and are increased on intentional movement and after exertion. These tremors vary from a fine twitching of the hands to gross rhythmical movements of the limbs, trunk, or head. The deep reflexes are increased. Paresthesias and pains occur in the limbs. There may be complaints of cramps in the calf muscles, generally worse after exertion. Edema of the legs is said to occur. Romberg's sign is not constant. There are no disturbances of deep or superficial sensation, no eye changes, no sphincter trouble, and no changes in the blood or urine. There are said to be no alterations in the spinal fluid, but in each of the three cases reported an excess of globulin was found.

Manganese produces no life-shortening degenerations. Patients having slight cases in the early stages may recover, but patients having advanced cases become life-long cripples, some non-vital part of the nervous system being irrevocably destroyed—probably the lenticular nucleus or its connections and the thalamus.

Three quite typical cases from the author's practice are described, two in men whose occupation consisted of shoveling mineral manganese, and one in a man who ground manganese ore and threw the dust into a chute. The patients are living but are disabled by the rigidity.

A brief reference is made to the literature on manganese poisoning, and the similarity of many of the symptoms to progressive lenticular degeneration noted, but that disease is invariably progressive and fatal, whereas the manganese cases improve or remain stationary when exposure to manganese ceases.

Lastly, the possibility of manganese as an etiological factor should be borne in mind and excluded before a diagnosis of functional disease or of disseminated sclerosis is made.—H. M.

EFFECTS OF THE X-RAYS AND RADIUM ON THE BLOOD AND GENERAL HEALTH OF RADIOLOGISTS. *G. E. Pfahler. Abstr. from Am. Jour. Roentgenol., Oct., 1922, vol. 9, p. 647, in Jour. Radiol., Jan., 1923, vol. 4, pp. 27-28.*

Dr. Pfahler cites the known cases of death from direct or indirect exposure of radiologists and their assistants to radium and X-rays. The investigations of workers both here and abroad are reviewed and the following conclusions are given:

(1) Undue exposure to the X-rays or radium is associated at times with a moderate leukoplakia, a relative lymphocytosis, a relative polycythemia, and occasionally an eosinophilia. (2) A low blood pressure, which does not seem to be associated with any other definite symptoms, is quite common in radiological workers. (3) The asthenia, sometimes noted, can probably be accounted for by strenuous work, caused by the great interest and also by the desire to meet the heavy overhead charges which must be carried by the radiologist. These symptoms are also probably caused by close confinement, lack of fresh air, and lack of recreation. (4) The skin changes found in the earlier workers are not increasing, and are being avoided entirely by the younger ones, because of increased knowledge and increased protection. (5) Complete protection can undoubtedly be obtained. It requires not only the means, but continual caution on the part of the individual. (6) Increased protection is needed by those who are working with the gamma rays, or with

the higher voltage X-rays. (7) A dental film carried in the pocket for two weeks will give a quick index of excessive exposure. If definitely fogged or blackened, protection should be increased. (8) Shortening the hours of work and increasing the amount of fresh air and recreation will probably remove symptoms, and prevent future trouble.

HISTOGENESIS OF TAR CANCER. *H. T. Deelman. Abstr. as follows from Ztschr. f. Krebsforsch., Oct. 19, 1922, vol. 19, in Jour. Am. Med. Assn., Dec. 23, 1922, vol. 79, p. 2202.*

Deelman publishes a very careful study on the histologic changes in beginning tar cancer of mice. The cancer cannot be prevented by stopping the application of tar after macroscopic changes have appeared, although it seems that the changes of the seemingly benign affection into cancer occurs earlier if the irritation is continued.—K. R. D.

DEMONSTRATION OF EXPERIMENTAL TAR CANCER PRODUCED IN WHITE MICE. *Blum. München. med. Wchnschr., Dec. 8, 1922, vol. 69, p. 1710.*

At a meeting of the Medical Society of Cologne, Blum demonstrated experimental tar cancer in white mice. He discussed the question of local irritation versus chronic toxicosis. The theory of "specific cancer parasites" has been abandoned and the newer experiments have lent support to the old theory of irritation, especially to the view of Lubarsch that the cancer problem is not a problem of specificity but of quantity, and also to the view of Ribbert as to the significance of connective tissue changes in starting the unlimited epithelial proliferation. Blum's experiments began in December, 1921, with white mice painted every third day with anthracite coal tar. The first positive result appeared at the end of seven months.—A. H.

EXPERIMENTAL TAR CANCERS. *R. Bierich. Abstr. as follows from Klin. Wchnschr., Nov. 11, 1922, vol. 1, p. 2272, in Jour. Am. Med. Assn., Jan. 6, 1923, vol. 80, p. 68.*

Bierich finds that in the first stage after the continued application of tar, the fibers of connective tissue swell and elastic fibers multiply. Mast cells appear in numbers. All of these changes stop and even retrogress in the second stage, when the epithelium seems to overcome this barrier and grows into the depths. Since changes in the connective tissue can be produced by an application of roentgen rays or by repeated subcutaneous injections of arsenic, Bierich tried to prevent tar cancer formation in animals by these methods. His success speaks for the protective influence of connective tissue.—K. R. D.

EXPERIMENTAL TAR CANCER. *R. Bierich. München. med. Wchnschr., Dec. 15, 1922, vol. 69, pp. 1738-1739.*

Bierich undertakes to discover the nature and mode of action of the cancer-producing factors in tar. Evidently their action is conditioned by quite definite properties, both of the protoplasm and of the physical-chemical structure. Experiments on white mice showed that the action of the tar is not confined to the place where it is applied but that its active constituents penetrate into the neighboring connective tissue, are taken up by the blood, and excreted by the kidneys.—A. H.

EXPERIMENTAL PRODUCTION OF CANCER BY ARSENIC. *A. Leitch and E. L. Kennaway. Brit. Med. Jour., Dec. 9, 1922, vol. 2, pp. 1107-1108.*

The authors discuss the possibility of arsenic being the active causative agent in the creation of industrial skin cancers. Apparently there are about thirty cases on record, in which people who are suffering from psoriasis, and who have undergone arsenical treatment for periods lasting from two to thirty years, have developed epitheliomata. Apart from these cases there is little clinical evidence that arsenic can induce cancer. Miners dealing with ores of high arsenical content show no special liability and the semi-mythical arsenic eaters of Styria have not, within knowledge, furnished any example. The amount of arsenic in coal tar and in paraffin is very small, and there is no evidence that it produces tumor. Also no one has so far suggested that the wide use of arsenical preparations in the treatment of syphilis has been productive of cancer.

In the hope of determining experimentally whether arsenic might not act as a carcinogenic agent, a series of rats and mice was fed on bread containing arsenic. The death rate was high but no tumors appeared. The of-

fect of arsenic applied locally was then investigated. An alcoholic solution of potassium arsenite (0.12 per cent.) was applied three times weekly between the shoulders of the hundred mice used. In three months two-thirds of the mice were dead, but an undoubted epithelioma together with a metastatic nodule in one lung was produced in one of the survivors.—W. F. D.

EXPERIMENTAL SOOT CANCER. *R. D. Passey. Brit. Med. Jour., Dec. 9, 1922, vol. 2, pp. 1112-1113.*

This paper describes experiments made to obtain an active fraction out of soot which would produce cancer artificially in a reasonable percentage of cases. The only preparation which proved effectual was prepared by making a paste of three parts of soot and one part of quicklime with distilled water, and drying this by spreading it in a thin layer on glass plates. When dry and free from the smell of ammonia this was broken up finely and repeatedly extracted with ether until the color became that of light sherry. The washings were filtered and distilled until the residue became of the consistency of a thick syrup. Of the mice subjected to the application sixteen out of eighteen survivors at the end of three months exhibited warts, and half of these subsequently developed cancer.

A subsequent series of experiments was made with this particular fraction with a view to ascertain whether the presence or absence of fat-soluble A vitamine in the diet had any influence on cancer growths. The results were negative.—W. F. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

STUDIES ON TUBERCULOUS INFECTION. IX. INFLUENCE OF INHALATION OF COAL DUST ON TUBERCULOUS INFECTION IN GUINEA-PIGS. *H. S. Willis. Abstr. as follows from Am. Rev. Tuberc., Nov., 1922, vol. 6, p. 798, in Jour. Am. Med. Assn., Dec. 23, 1922, vol. 79, p. 2190.*

Willis' observations show that coal dust accumulates slowly in the lungs of guinea-pigs exposed repeatedly to its inhalation. It tends to become localized in the alveoli and alveolar walls, under the pleura at intervals, in the lymphoid tissue situated along the air and blood passages and at the hilum, and along the lymphatics in the adventitia of these tubes and vessels. After infection tubercle develops somewhat more abundantly in lungs of animals exposed to dust than in those of normal animals. The ratio is about as three to two. Dust cells usually can be found in and about foci of tuberculosis in lungs that have been well exposed to dusting.—K. R. D.

PULMONARY TUBERCULOSIS PRODUCED EXPERIMENTALLY BY ASPIRATION. *H. J. Corper. Abstr. as follows from Am. Rev. Tuberc., Nov., 1922, vol. 6, p. 851, in Jour. Am. Med. Assn., Dec. 23, 1922, vol. 79, p. 2190.*

The upper lobe localization of pulmonary tuberculosis, the most common type of the disease found in man, Corper says, can be reproduced in dogs (in the sense of human postural anatomy) by the instillation of suspensions of tubercle bacilli into the nose while the animal is lying in the horizontal posture (on the right or left side depending on the side on which involvement is desired) during ether anesthesia with the head slightly elevated. These experiments with tubercle bacilli verify the postural studies previously reported in animals in which India ink was used. By means of dead human tubercle bacilli, aspirated under ether anesthesia, all of the important characteristics of the disease in man may be reproduced, except progression in the true sense of the term, such as would naturally be dependent upon actual multiplication of the bacilli in the lungs. The most important of these changes, including massive tuberculous granulation tissue formation with subsequent necrosis followed by discharge into the bronchi and resulting cavity formation, fibrous pleural adhesions, and intrapulmonary capillary hemorrhages are all obtained and in definite sequence, indicating that the full tissue damage initiated when the bacilli enter the lungs is not exhausted for a considerable period of time: visible cavities were found only after 139 days, while intrapulmonary capillary hemorrhage was seen

regularly earlier (after forty-one days).—K. R. D.

PNEUMOKONIOSIS AND TUBERCULOSIS: SPECIAL REFERENCE TO BOTH DISEASES IN POTTERS. *H. R. M. Landis. Abstr. as follows from Am. Rev. Tuberc., Nov., 1922, vol. 6, p. 766, in Jour. Am. Med. Assn., Dec., 23, 1922, vol. 79, p. 2190.*

The hypothesis is advanced by Landis that silica is the most irritant of all dusts and that those exposed to it in its pure form are incapacitated in from two to eight years. In other words, it will produce as much damage in this brief period as occurs after from thirty to fifty years in a pottery or in a coal mine. Instead of being a slow chronic process, silicosis is a subacute and in some instances a distinctly acute process. It would, therefore, seem that lungs acutely or subacutely inflamed might readily become a fertile field for the tubercle bacillus. Landis emphasizes the fact that no dust, not even silica, can cause tuberculosis. It may, as in the case of silica, predispose the individual to the disease, but without the presence of the tubercle bacillus tuberculosis cannot develop.—K. R. D.

INDUSTRIAL ANTHRAX. *Lancet, Jan. 20, 1923, vol. 204, p. 142.*

The Advisory Committee on Anthrax, convened by the Third International Labour Conference, met in London December 5 to 14, 1922, and after long and lively discussion resolved:

1. That hair used in the brush-making and upholstering industries shall be disinfected before the materials are handled industrially.

2. That wool and hair to be used in the textile industry shall be disinfected before the materials are handled industrially, except in the following cases: (*a*) if the country of origin is included in the schedule of countries where the danger is slight; (*b*) if the material to be imported has already been disinfected by a process recognized as effective; (*c*) if wools and long hair have to be sorted before washing, unless these products are not included in the list of harmless products; (*d*) in such other cases as may be determined by the committee.

The committee held that prevention of anthrax among flocks calls for (1) compulsory notification and official verification of cases of anthrax; (2) isolation of animals suffering from or suspected of suffering from anthrax; (3) the destruction of the entire carcass of any animals dead of, or suspected to have died of, anthrax, and disinfection of the immediate surroundings of the place where the animal died as well as of the premises where it was kept; and (4) preventive inoculation of animals against anthrax.

Finally the following resolution was adopted:

The committee is of opinion that in most countries the principal danger of industrial anthrax arises in the manipulation of hides and skins, and recognizes the impossibility of securing at the present time complete disinfection to protect against this danger.

The committee, therefore, recommends that regulations be laid down in the different countries having for their object the protection of the workers and the soil against infection by anthrax from hides and skins.

The committee further suggests that the International Labour Office, in conjunction with the Health Committee of the League of Nations, should organize international research and invite nations and organizations chiefly interested to undertake such research in their respective countries.

The committee considers that in view of the fact that all countries using infected materials will benefit by the discovery of a satisfactory process of disinfection it is desirable that the governing body should take into consideration the possibility of finding grants in aid of research undertaken for that purpose.

—E. L. C.

MEASURES FOR THE PREVENTION OF ANTHRAX. *Internat. Labour Office, Indust. and Labour Information, Oct. 31, 1922, vol. 1, pp. 229-230.*

An Austrian decree, recently issued, contains measures for the protection of workers against the danger of contracting anthrax, whether in factories which handle raw hides and skins, horns, claws, and other parts of animals which may have been infected with anthrax, or in industries which utilize the manufactured products, such as leather, wool, skins, brooms, and brushes.

Where it cannot be proved that the raw materials from which these products have been manufactured have been procured from Austrian slaughter houses, or have already been disinfected according to the regulations, they shall be subjected to the following treatment as provided:

(*a*) Exposure to steam of 0.15 atmospheric pressure for at least one hour.

(*b*) Boiling in a 5 per cent. solution of carbonate of soda or potash for at least two hours.

(*c*) Treatment by the Schattenfroh or Es-

march process or any other process approved by the Ministries.

Other precautionary measures are listed. —M. C. H.

Malarial Infection in Relation to Accidental Injury and to Surgery. *F. Cioffi. Abstr. from Arch. ital. di chir., 1922, vol. 5, p. 533, in Med. Science, Jan., 1923, vol. 7, p. 301.*

The author is not concerned with the influence of an existing malarial infection upon the occurrence of accidents; or with its effect in preventing or prolonging the healing of wounds; or with the persistent symptoms, such as wound neuralgia, in the infected; but with the possibility of a recrudescence of long quiescent malaria as the result of trauma or of surgical operations. There has long been recognized an effect of this kind following direct injury to the spleen or heavy blows over the splenic region, and indeed the evidence for it is copious. There is also a certain amount of ground for admitting that injuries to long bones are competent to reawaken infection. In both cases the rationale of the process is clear, since they are the hemopoietic organs, but it is important, from the medico-legal and accident-insurance aspects to know whether all traumata and simple operations can be held responsible.

Cioffi has made inquiries from a large number of Italian hospitals to which numerous malarial subjects are admitted, concerning these points, and has found that in those clinics in which chloroform is used it is extremely common for simple operative procedures to be followed in a day or so by malarial attacks, but that in those in which chloroform has been abandoned nothing of the kind is observed. He has also made observations on sixty railway employees, who were known to have suffered from malaria, who were also injured, and in whom there was at a later period evidence of a persistence of the parasites in the blood, and in none of them was an attack determined by the trauma even when it concerned the bones.

He concludes that, as far as evidence goes at present, trauma, unless directly to the spleen or splenic region, and possibly such as to injure the bone-marrow, is not to be held responsible for a recrudescence of malaria. Surgical operations of discretion, such as those for hernia and the like, required by assured workmen, can be undertaken with security in this respect as long as chloroform is not the anesthetic agent. There is a general review of the literature.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Some New Occupation Dermatoses. *R. Ruedemann, Jr. Ohio State Med. Jour., Sept., 1922, vol. 18, pp. 618-620.*

Industrial medicine offers a fertile field for research to the dermatologist. The predisposing factors of industrial dermatoses include dry or oily skin, freely-perspiring skin, circulatory disturbances, and previous trauma or irritation. Personal susceptibility and acquired immunity due to repeated irritation offer puzzling problems. Exciting causes include heat, cold, friction, parasites, and chemical irritants.

Among a large number of woods causing dermatitis are redwood and teak. Cocobolo wood dust sets up an irritation which in its common form resembles that from poison-ivy. Soothing lotions and mildly astringent washes are indicated in early cases although change of occupation is sometimes necessary.

In the rubber industry much trouble is experienced from aniline, benzol, and hexamethylenetetramine. The last breaks down to either formaldehyde or formic acid in an acid medium like perspiration, and produces an erythematous or an acute vesicular dermatitis. Alkaline washes help to protect the worker by neutralizing the acid.

A careful investigation of so-called "ink poisoning" proved that the trouble was caused not by chemicals in the ink itself, but by a combination of factors such as vigorous scrubbing of the hands, drying of the skin by benzol used in cleaning plates, and delayed healing of abrasions due to the presence of ink in them. The use of ointments and gentler cleansing methods served to overcome the condition.

Conclusions drawn are: (1) that trade eczemas vary with individual susceptibility and with the exciting cause; (2) that preventive methods are more important than treatment; (3) that industries making use of hydrocarbons, benzol, and amido-benzenes must protect workers through close supervision; and (4) that the dermatologist and the industrial physician must co-operate earnestly.—G. N. T.

Occupational Injuries of the Skin. *M. Oppenheim, J. H. Rille, K. Ullmann. Leipzig, Leopold Voss, 1922. Reviewed in München. med. Wchnschr., Oct. 27, 1922, vol. 69, p. 1516.*

The first part of this book, which takes up the general etiology and nature as well as the history of industrial dermatoses, and also the various occupational stigmata of the skin, appeared in 1915. The final part of this Volume I has just appeared. It deals chiefly with physical injuries to the skin, produced by cold and heat, electricity, rays of light, radio-active substances, and compressed air. In addition there is a section on occupational tuberculosis of the skin, ulcers of the feet, and typical industrial injuries or wounds of the skin and soft parts. Finally there is a chapter on laws for the protection of workmen. Each chapter is written by an experienced authority, the work is abundantly illustrated with black and white and colored plates, and has a complete bibliography.—A. H.

Erysipeloid. *W. Dubreuilh and P. Joutia. Ann. de derm. et syph., Dec., 1922, pp. 609-614.*

Any slight wound or injury which does not heal rapidly or satisfactorily is popularly called septic. Such wounds are generally the result of infection by the flora of the skin, the staphylococcus or streptococcus; both are aerobic organisms. Less known causes of sepsis are the anaerobic bacteria which cause erysipeloid. The disease, as a clinical entity, is well appreciated by dermatologists. It was first described, from cases seen in butchers, by Morrant Baker in 1873 under the name of erythema serpens. Rosenbach rechristened it and numerous other investigators, including Ohlemann and Gilchrist, have reported examples of the disease. The latter saw a large number resulting from the bites of crabs.

The writers review five cases, four of which followed injury from the bones or shells of fish, and one from a scratch by a splinter from a meat bone. Two or three days later, round the wound there appeared a red zone which gradually extended. Ultimately the whole of a finger, with part of the hand, became involved. The spreading edge was slightly raised, infiltrated, painful, and tender upon pressure. The older portions gradually assumed a dusky tint, and were slightly depressed, and scaly. In two or three weeks all the inflammation subsided under a simple treatment.

These are the first cases of this nature recorded in French literature. The authors record it as a septic condition allied to erysipelas. It differs in the slowness of onset, absence of constitutional symptoms, and marked tendency toward recovery. They think that the pathogenic organism is probably anaerobic, but their cultures of the serum, taken from the spreading edges of two of their cases, proved negative.—R. P. W.

A Skin Eruption Due to a Mould. *C. Russ. Lancet, Jan. 13, 1923, vol. 204, pp. 77-78.*

This eruption affected a small group of workers employed in packing and sorting various kinds of dried fruit. The writer considers that the constant rubbing of the forearms against the sacking, placed on the work benches, caused the rash. This sacking had contained the dried fruit, which came from all parts of the Orient and the Colonies. On the fourth day following infection raised red papules appeared, which became vesicular on the sixth day and pustular on the eighth. The lesions were invariably situated only on the palmar surface of the forearms. Smear preparations, taken by the author, revealed nothing very characteristic, but after fourteen days' cultures there developed a fine filamentous growth, which on examination showed a freely branching mycelium, bearing endospores. Prof. G. Massee, to whom a pure culture was submitted, reported it to be a typical cercosporella, but one which does not correspond to any previously described variety. He suggested the name *cercosporella vexans*. It resembles the asteroid trichophytons.

The writer gives an illustration of the le-

sion caused by inoculating the fungus into his own arm, also one of a five weeks' growth on Sabouraud's medium.—R. P. W.

ÆTIOLOGY OF DERMATITIS IN BAKERS. *O. de Jong. Lancet, Jan. 13, 1923, vol. 204, p. 80.*

At a meeting of the Liverpool Medical Institution a paper was read by Dr. Oscar de Jong in which he said that this dermatitis occurred only in bakeries where the hands were used in mixing, not in bakeries where machines were used. Investigations showed that the flour used was not responsible, as no cases of dermatitis were found in men employed in flour mills, though they were constantly handling flour. Similarly, no cases were found in men handling or preparing yeast. Dr. de Jong also said that the condition was due to immersing the hands and arms in the salt solution added to the flour. This was about 3.6 per cent. in strength. The salt crystallized on the arms of the workers, and kneading forced the crystals into the skin; a dermatitis was thus set up in susceptible individuals.

Dr. de Jong suggested as a preventive the use of a spray of fresh water after mixing the salt solution and at periods during kneading. The condition relapsed as a rule when the patient returned to work.—R. P. W.

INDUSTRIAL HYGIENE: EXPERIMENTS WITH OILS. *J. E. Heestermann. München. méd. Wchnschr., Dec. 22, 1922, vol. 69, p. 1771.*

Heestermann, experimenting with a view to determining the exact cause of the different skin lesions caused by machine oils, used various lubricating and cutting oils, rubbing them on the shaven skins of rabbits, and found that the irritating substances belong to the more volatile constituents of the oil but that they are neither of basic nor of acid nature nor do they belong, as Weichardt and Apitzsch thought, to the unsaturated compounds, nor are they asphalts. They can be removed from the oils by purification with sodium hydrate and sulphuric acid.—A. H.

PROCAIN DERMATITIS AMONG DENTISTS. *H. K. Gaskill. Abstr. as follows from Arch. Dermat. and Syphil., Nov., 1922, vol. 6, p. 576, in Jour. Am. Med. Assn., Dec. 2, 1922, vol. 79, p. 1955.*

Nine cases of dermatitis among dentists are cited by Gaskill in which procain was believed to be the cause but was shown later not to be concerned in the etiology. For persons who are subject to irritation of the hand on account of certain chemicals Gaskill suggests the use of an ointment composed of 25 per cent. hydrous wool fat and 75 per cent. petrolatum, heated in a water bath; 2 per cent. of phenol is added, thoroughly mixed and allowed to cool in a jar. A small quantity of this is rubbed thoroughly all over the hands and the excess is wiped off. The taste is not especially unpleasant to the patient, though a small quantity of ointment of rose water can replace a part of the petrolatum.—K. R. D.

EYE TESTS ARE IMPORTANT. *N. M. Black. Hosp. Management, Oct., 1922, vol. 14, pp. 66-68.*

The study of industrial operations made by the Federated Engineering Societies shows that more than 25,000,000 men and women employed in the United States have substandard vision requiring correction. The writer takes the position that physical examinations with special reference to eyesight should be given everyone applying for a position in a manufacturing establishment. This would facilitate the correction of faulty vision by glasses, with resultant better health and improved output. Poor vision is a possible cause of accident, because a man so affected cannot watch his work or the machinery with which he is working as well as can the normal individual. Once a man is examined and found to have a visual defect, he can be placed in a position where he will be able to accomplish better work and be less of a menace to his fellow employees.

Labor unions have made some objections to physical examinations alleging that employers often make use of them as an excuse to reject labor leaders and to discharge union men. Employers and labor unions are, however, coming to look at the subject in a broad-minded way, both realizing that best results are secured by acquainting the employee with his visual shortcomings, by directing him to obtain relief, and by seeing that he is placed where he can do the best work with the least strain.—G. N. T.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

CAUSES AND PREVENTION OF ACCIDENTS IN THE IRON AND STEEL INDUSTRY, 1910-1919. *L. W. Chaney. U. S. Bur. Labor Statis., Bull. No. 298, June, 1922, pp. 398.*

This report endeavors to bring together the results of a study of accidents in the iron and steel industry which has been going on in the Bureau of Labor Statistics during the last ten years.—M. C. H.

THE IRREDUCIBLE MINIMUM IN INDUSTRIAL ACCIDENT. *S. P. Moore. Nation's Health, Dec., 1922, vol. 4, pp. 749-750.*

The safety appliances of the average industrial plant can forestall not more than 25 to 33 per cent. of industrial accidents. The remainder which are charged to the unpredictable personal equation must not be accepted as unpreventable. Far more often than is generally appreciated the underlying cause of accident is fatigue, clumsiness, or inexperience. When the mechanical features of inspection and protection are perfect, preliminary training adequate, and supervision scientific, then only may the accident be charged to the personal equation.—L. A. S.

PREVENTING BURNS AND BLISTERS IN HOT WORK. *Nat. Safety News, Dec., 1922, vol. 6, pp. 21-23, 33.*

In plants where there is much handling of hot material, loss of time due to burns reaches a large figure. Safety engineers are coming to realize this and are taking measures to prevent burns through education of workmen to personal carefulness, through introduction of proper clothing, and through adoption of ingenious mechanical devices.

Special problems have been met satisfactorily in many plants. Heavy metal-cased flexible hose for supplying water to water-cooled doors of open hearth furnaces and special charging pans with drainage holes to take care of melted snow have been very effective in preventing explosions in steel plants. Flexible chain shields to protect the workman while pouring steel into molds have stopped burns formerly caused by splashing of the hot metal. Properly placed shields protect workers in asphalt plants from contact with steam, pipes, and with the heated product, while transportation of the latter is effected in specially designed trucks or through insulated pipe lines. Furnaces for melting steel in some cases have chain curtains cooled by a steady drip of water. Strict regulations as to placing of hot pieces in trays in designated places prevent accidents. It has been found possible to abolish the time-honored method of throwing and catching hot rivets through the use of a 2-inch carrier pipe. Special gauntlet leather gloves have been designed for the exacting work of acetylene welding.

The article has ten illustrations showing the use of such safety devices in designated plants.—G. N. T.

MANAGEMENT OF HEAD INJURIES WITH REAL OR POTENTIAL BRAIN DAMAGE. WITH SPECIAL REFERENCE TO THE VALUE OF SATURATED SOLUTIONS OF MAGNESIUM SULPHATE AND SODIUM CHLORID. *C. E. Dowman. Jour. Am. Med. Assn., Dec. 30, 1922, vol. 79, pp. 2212-2214.*

The main points of this paper are summed up in the author's conclusions:

1. All head injuries should be carefully studied and the type of injury properly estimated before the institution of any particular treatment.

2. No treatment is of avail in those cases of massive brain injury presenting evidence of rapid exhaustion of the medullary centers.

3. The treatment of middle meningeal hemorrhage can be greatly facilitated by ligating the external carotid artery.

4. The technic advised by Cushing in the treatment of war wounds of the skull and brain should be used in the treatment of those cases of brain injury in which there is localized brain contusion.

5. Subtemporal decompression is still the treatment of choice in cases of brain injury when there is evidence of gross brain laceration, and the patients are yet well within the so-called period of medullary compensation.

6. Saturated magnesium sulphate solution by mouth will prevent the occurrence of increased intracranial pressure due to fluid accumulation and thereby prevent the necessity of late operation in many cases of brain injury in which immediate operative intervention does not seem to be indicated.

7. Saturated solution of sodium chlorid intravenously is of inestimable value in re-

leving acute increased intracranial pressure due to fluid accumulation occurring several days after head injuries, with definite brain injury.—K. R. D.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Fatigue Tests at Purdue University. *G. H. Shepard. Indust. Management, Dec., 1922, vol. 64, pp. 354, 357.*

This article gives the results of tests started in 1920 and 1921 (described in *Industrial Management*, Nov., 1921) and continued in 1921 and 1922 at Purdue University. The investigation was limited to light-heavy muscular work involving continual repeated muscular effort but without producing a sense of muscular strain. The object was to determine as accurately as possible the minimum proportion of rest time to total working hours. The results indicate that with a nine-hour working day maximum output is secured by resting at least 16 2/3 per cent. of the time, and that a work period of forty minutes followed by rest of about eight minutes seems to be a favorable arrangement. Even greater efficiency might be secured by making the working period longer at the beginning of the day and gradually shortening it. It is hoped from further tests to draw more definite conclusions. It was found that loss of sleep, exertion, and excitement incidental to a sorority house fire at night decreased one man's working power 9 per cent. on the following day.—G. N. T.

WOMEN AND CHILDREN IN INDUSTRY

State Laws Affecting Working Women. *U. S. Dept. Labor, Women's Bur., Bull. No. 16, 1921, pp. 51.*

This report presents a summary of the majority of state laws affecting women who work. Ten charts and five colored maps enable the reader to make comparisons between different states. The particular laws considered are those regulating hours of work, providing for a minimum wage; controlling the conditions of home work, and providing pensions for mothers.

All but four states—Alabama, Florida, Iowa, and West Virginia—have some law regulating the hours of work for women. The daily work period permitted varies from eight to twelve hours, and the weekly one from forty-eight to seventy. These limitations apply only to specified occupations. In general, the states having the shortest working day and week also include the greatest number of occupations within the law. Nineteen states and two territories provide for breaks in the hours of employment to allow rest periods and time for meals. They also require a day of rest or a shorter working day at certain intervals. Thirteen states and one territory prohibit night work for women in certain industries. The outstanding fact in a consideration of these laws affecting hours of work is that no one state has covered every phase of the subject. Those states having industrial commissions are accomplishing more than those dependent on separate acts of their legislatures.

Twelve states have minimum wage laws, usually administered by boards or commissions whose rulings are mandatory, except in Massachusetts. Rates established vary from $7.50 to $20 per week.

Laws prohibiting or regulating home work have been passed in about one-fourth of the states. These laws cover cleanliness, adequate lighting and ventilation, and protection from disease.

Forty states have pension laws for mothers, designed to help women who need assistance in bringing up their children properly in their own homes.

From a study of the charts and maps it is evident that every state has failed to cover fully the possible types of legislation for the protection and help of its women citizens.—G. N. T.

Women in the Candy Industry in Chicago and St. Louis. A Study of Hours, Wages and Working Conditions in 1920-1921. *U. S. Dept. Labor, Women's Bur., Bull. No. 25, 1923, pp. 72.*

A survey of the candy industry was made in these two cities during the period from

February to April, 1921, admittedly a time of industrial depression. Thirty-two establishments were inspected in Chicago and nineteen in St. Louis. None of these had a working day of more than nine hours. The Illinois state law permitted employment of women for seventy hours a week, but none actually worked more than fifty hours. St. Louis had seven factories where women were employed the full fifty-four hours per week permitted by law. Wages were decidedly low, wage cuts, discontinuance of bonuses, curtailed working schedules, and slackened production bringing down the median weekly earnings in Chicago to $14.63 per week, and in St. Louis to $11.95 per week. The latter figure is believed to be less than a living wage.

As in all investigations of this nature, a great variety of conditions was found, some factories maintaining sanitary, well-lighted workrooms with proper attention to the well-being of employees, while a greater number failed in some respects to come up to a minimum standard. Most noticeable were dirty workrooms, due to lack of systematic cleaning, and insufficient washing facilities for the employees. Thirty-seven factories fell below the standard of providing hot and cold water, soap and individual towels. Forty failed to supply proper sanitary arrangements for drinking. Hospital rooms were found in seven plants, and a nurse or doctor in attendance in seven. From a health standpoint the failure in many plants to provide suitable seats was a serious feature, resulting in much unnecessary strain. The necessity of maintaining a lowered temperature in chocolate-dipping rooms resulted in hardship to the workers when they were exposed to drafts of cold air or kept in ill-ventilated rooms cooled by ammonia pipes. In some cases women were obliged to lift to a height above their heads boxes weighing from 30 to 50 pounds. Speeding up of work with consequent overfatigue was also noted. Accidents were rare, but the possibility of them was ever present in nineteen plants because of unguarded belts, and in several others because of unclosed elevator shafts.

In all respects conditions were better in Chicago than in St. Louis.—G. N. T.

WOMEN IN MARYLAND INDUSTRIES. *U. S. Dept. Labor. Women's Bur., Bull. No. 24, 1922, pp. 96.*

This report gives results obtained in a survey of hours and conditions of work in fifteen cities of Maryland. Manufacturing and mercantile establishments, laundries and restaurants were investigated with the object of getting definite information regarding numbers of employees, their hours, and working conditions. Additional facts relating to age, nationality, experience in the trade, and living conditions among employees were gathered. The survey was planned so that the localities and industries covered would be representative of conditions throughout the state.

It was found that there was imperative need for more careful protection of women. Laws in force did not cover the subject fully, and were often disregarded either deliberately or through ignorance of their existence. Insanitary conditions were frequently encountered, and women in many instances were forced to work under dangerous conditions, subjected to unnecessary strain, and with inadequate toilet and rest facilities. Although the eight-hour day has become the standard in several industries, many women were working the full ten-hour day permitted by law, and even longer. The report recommends that Maryland enact more liberal legislation, particularly with reference to an eight-hour day and an adequate minimum wage.—G. N. T.

CHILD LABOR IN THE UNITED STATES. *U. S. Dept. Labor, Children's Bur., 1923, pp. 31.*

This report gives by the question and answer method a summary of child labor conditions. It is liberally provided with charts which enable the reader to make a ready comparison between different states and to get a comprehensive idea of conditions throughout the country. It is brought out that in 1920 over one million children in the United States were engaged in gainful occupations, the majority in agriculture. State standards are gradually being raised, a fact which compensates to some extent for the failure of federal statutes to survive the test of constitutionality. There is still much room for improvement, however, particularly in insisting on the acquirement of minimum educational standards and on adequate physical examinations before allowing a child to go to work. The eight-hour day and the

forty-eight-hour week are the rule. Five states set no limits on employment of children at night. Compulsory school attendance is universal up to specified ages and part-time school attendance for a further period is required in twenty-six states. A list of suggested minimum standards is appended.—G. N. T.

CHILDREN'S WORK ACCIDENTS. *New York State Dept. Labor, Special Bull. No. 116, Jan., 1923, pp. 42.*

This report gives an itemized statement of accidents to children under 18 years of age during the year July 1, 1919, to June 30, 1920, as a result of which compensation was awarded under the New York State Workmen's Compensation Law. From a study of the statistics conclusions are drawn and recommendations are made.

Striking facts noted are that four-fifths of the compensated cases were accidents to boys; that 80 per cent. of these occurred in processes of manufacture; and that 78.9 per cent. were injuries to the hands or arms. Power working machinery, particularly power presses, took the heaviest toll. Handling of objects, falls, stepping on or striking objects, falling objects, poisonous and corrosive substances, etc., followed in order.

Recommendations are made (1) that no child under 18 years of age be permitted to work on a cutting or a stamping machine in the metal industry; (2) that loosely written sections of the labor law be revised and clarified; (3) that treble compensation be the rule in the case of children suffering accidents when illegally employed, two-thirds of such compensation to be paid by the employer; (4) that precautions be taken against lifting and pushing of heavy objects by young workers; and (5) that proper training in the use of tools be required.—G. N. T.

THE STATUS OF CHILD LABOR IN OHIO. *E. N. Clopper. Nation's Health, Feb., 1923, vol. 5, pp. 101-102.*

In the United States as a whole, there was, in the decade from 1910 to 1920, an absolute decrease in the number of children 10 to 15 years of age, inclusive, reported as gainfully employed, from almost two million to slightly more than one million. At the same time, the number of children between these ages increased 15.5 per cent. The figures for 1910, however, represent the conditions on April 15 of that year, while the figures for 1920 represent the conditions on January 1. As the greater number of children gainfully employed are engaged in agriculture, this difference in the two census dates makes the figures for 1920 appear unduly favorable.

In Ohio the reduction in the number of children employed was from 8.4 per cent. of all children from 10 to 15 years of age in 1910, to 3 per cent. in 1920. Ohio State labor laws do not, however, apply to children in agriculture and the use of children in this occupation has become so extensive as to need control. The author therefore urges the necessity for harmonizing the administration of state school and of state labor laws.—K. R. D.

CHILD LABOR AND THE WELFARE OF CHILDREN IN AN ANTHRACITE COAL-MINING DISTRICT. *U. S. Dept. Labor, Children's Bur., Bull. No. 106, 1922, pp. 94.*

This report describes conditions among children from 13 to 16 years of age in a typical district during the year 1919. The children were chiefly of foreign parentage—Poles, Lithuanians, and Russian Jews. It was found that in spite of state laws, many children less than 13 years of age were working. Boys were chiefly employed on the "breakers," although a number were working underground. A considerable proportion of them had suffered accidents. The mines were on an eight-hour basis but much overtime work was necessary. Girls were found at domestic work, in cigar factories, and in clothing establishments. State laws prohibited the employment of children under 16 years of age for more than nine hours a day or fifty-one hours a week, but overtime beyond this was frequently the rule. In fact, a general disregard of child labor laws was apparent. Various reasons accounted for the children being at work, family need or the death of the bread-winner figuring prominently.

General educational and sanitary conditions throughout the district are described as poor. The quality of instruction in the school was below the average. Medical examinations of schoolchildren had been made at one time in a perfunctory way but had been discontinued by order of the school directors. The

infant mortality was among the highest in the country. The people were forced to live in congested quarters. Sewerage was bad, and the water supply, though of good quality, was inadequate. Opportunities for recreation were few.

An appendix gives a summary of the Pennsylvania Workmen's Compensation Act, and results of intensive investigations arranged in tabular form.—G. N. T.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

Clean Windows an Economy. *Nation's Health, Nov., 1922, vol. 4, p. 681.*

Clean windows, clean light bulbs and fixtures, and white walls will increase illumination and, reducing eyestrain, fatigue and accidents, will promote health. Merely by keeping lighting facilities in a state of cleanliness many shops can bring their illumination up to minimum requirements.—L. A. S.

Modern Tendencies of Ventilation Practice. *G. T. Palmer. Jour. Am. Soc. Heating and Ventilating Eng., Jan., 1923, vol. 29, pp. 27-44.*

This is a general review of progress made in ventilation during the last century.—P. D.

Employees' Wash Rooms. *S. DeHart. Indust. Management, Feb., 1923, vol. 65, pp. 118-120.*

The average American workman has come to expect good washing, drinking, and toilet facilities. Employers recognize the necessity for modern sanitation in the factory. Many states require the installation of washrooms for the prevention of occupational diseases, particularly in factories engaged in the manufacture of lead compounds.

This general recognition of the value of good washrooms has led to the installation of excellent equipment in many instances. White enameled lavatory troughs equipped with spray-heads and liquid soap dispensers have proved efficient. Circular wash fountains have been designed to give a shower bath to the face and hands. It has been found best to have no stoppers for troughs or fountains, each man thus having clean, fresh water for his use. One firm has established a room containing not only white enamel troughs, but clothing lockers as well. Each man is assigned a locker and has an individual faucet. Strict cleanliness is maintained in the room by a janitor, and it is required that all changing of clothes be done there.

The importance of having pure drinking water is emphasized by the writer, who recalls that 70 per cent. of the body-weight is water.—G. N. T.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Industrial Medicine and General Practice. *C. C. Burlingame. Nation's Health, Dec., 1922, vol. 4, pp. 745-747.*

During the past few years there have been so many fluctuations with regard to the status of the industrial physician that it is impossible to predict what the future holds in store for him. One thing seems certain: as long as the laboring man retains the right to choose his own physician, just so long will it be to the advantage of the industrial physician to form a partnership with the community practitioner.

The industrial physician will be on a sound basis with regard to his relations with the community physician while he confines himself to meeting the moral and legal interests of the company which he serves, by proper placement of employees on the job, by the necessary administration of any insurance schemes, and by the general supervision of the employees' health. All else should be referred to the doctors in the community. Absolute frankness and the fullest confidence on the part of both the industrial physician and the general practitioner are essential prerequisites in the maintenance of the general health and efficiency of the industrial group.—L. A. S.

Health Service in Dollars and Cents. *F. G. Barr. Hosp. Management, Oct., 1922, vol. 14, pp. 65-66.*

Important points brought out by years of

experience in health work at the National Cash Register Company are given in this article. Prospective employees receive a thorough physical examination. On acceptance they are given a health and safety lecture followed by a trip through the factory to stimulate their interest in the organization. Employees of all grades, from high executives to foundrymen, are impressed with the importance of attention to health and with the interest of the health department in them. The finest equipment is provided. All workers are weighed every six months and attention is given to those who are underweight. Visits to the department are entirely voluntary, but a total of 43,500 visits last year proves the popularity of the work among the employees.

The result of all this work, estimated as worth $76,000 to the employees, is that last year among 6,000 employees the average loss of time was eleven and one-half hours. By contrast an average obtained from thirty different industries, as well as from the records of the Metropolitan Life Insurance Company and the United States Public Health Service, was six to eight days. The company thus effected a saving of approximately fifty hours per employee. Since there were 6,000 employees, a total saving of $120,000 was made. Such figures prove convincing to a manager or president when health service is being advocated.

Saturday morning health talks to children, the system of keeping rating cards of the men, with health the most important item, and medical examinations of all foremen, supervisors, and executives are listed among other activities.—G. N. T.

ELIMINATION OF WASTE THROUGH PREVENTION OF SICKNESS. *E. N. Huyck. Sixth Ann. Indust. Conference of New York State, Nov., 1922, pp. 169-176.*

This is a discussion from the point of view of the small employer. It is admitted at the outset that waste due to sickness can be prevented. The point discussed is whether the small employer can undertake such prevention with a fair prospect of economic benefit both to the worker and to the company.

The author has found from eleven years' practical experience in his factory that a plan of sick benefits, service pensions, free medical service, and hospital treatment has cost but 3.16 per cent. of the wages of the workers covered. He recommends that a contributory feature be included in such a plan; the workers for his own concern pay 1 per cent. of their wages toward the health insurance. He believes that a plant steadily employing 200 persons can afford to have a full-time nurse. His concern, with 600 employees, has both a nurse and a full-time physician, the latter an ex-army officer. The estimated cost for the services of both is less than 1½ per cent. of wages paid. Medical examinations of new workers, and employment supervision come under the duties of the plant physician. Defective teeth and vision receive attention, men are placed in work for which they are best fitted physically, and medical service is furnished in all cases of accident or illness.

Factors which show that the work is on a paying basis are better labor return, lessened labor turnover, and better quality of product. The improved health of the workers, and the saving of workers' lives are other gratifying features that count heavily. It is recommended that concerns contemplating the adoption of such work proceed cautiously, that every step be explained to the employees carefully in order that misunderstanding may be avoided, and that the details be worked out in co-operation with a committee of the employees.—G. N. T.

HEALTH SERVICE OF DEPARTMENT STORE. *Hosp. Management, Jan., 1923, vol. 15, pp. 68-69.*

The R. H. White Company of Boston has four large well-lighted rooms in its building set aside as a health department for the care of accidents and illness among its employees. A full-time nurse, a doctor who spends two hours a day at the store and who is on call at other times, and a visiting nurse make up the staff. The store physician, as a matter of policy, treats no store employee as a private case. General policies and conduct have been developed in co-operation with the Harvard Mercantile Health Work. In the year 1921 there was a total of 10,819 visits to the department by employees. Accidents to customers are also taken care of. This provides prompt attention and furnishes an opportunity to make out accurate insurance reports. The word of the health department is regard-

ed as final as to whether an employee is too ill to work; thus the over-conscientious employee is protected and loafing is prevented. This health service has won the confidence of the employees.—G. N. T.

GOOD TEETH IMPORTANT IN INDUSTRY. *O. U. King. Nat. Safety News, Dec., 1922, vol. 6, p. 29.*

There has been a tremendous loss to industry brought about by defective teeth. Education is the real solution of the great mouth hygiene problem. If 50 per cent. of the citizens of the United States would adopt the slogan *A Clean Tooth Will Not Decay,* ten years would be added to the average life of man. When the American people awaken to this fact, then only will the mouth hygiene problem become recognized as a great economic one and the solution assured. As a result of dental work done in the industrial field under varieties of industrial clinics, many diseases are said to be traceable to the menace of mouth infection, among them chronic invalidism; raising or lowering of the blood pressure; enlargement of the thyroid gland; serious disturbances of the blood, heart, kidneys, stomach, intestines and joints; diabetes; serious vocal infections and serious brain and nerve disturbances, including neuritis.—G. N. T.

INDUSTRIAL DENTISTRY AND ORAL HYGIENE. *R. I. Humphrey. Nation's Health, Dec., 1922, vol. 4, pp. 751-752.*

Only those dentists who have been engaged in industrial work during the past few years fully realize the extremely insanitary condition which actually exists among the industrial population.

If preventive methods are to safeguard public health, oral hygiene must become an integral part of industrial medicine.—L. A. S.

PIONEER INDUSTRIAL HOSPITAL ERECTS NEW PLANT. *J. B. Lowman. Nation's Health, Dec., 1922, vol. 4, pp. 747-748.*

The new hospital recently erected at Johnstown, Pa., by the Cambria Steel Company for its employees is pronounced one of the first industrial hospitals in existence. This article is concerned only with a description of its construction and of the departments which it includes.—L. A. S.

INDUSTRIAL NURSING

INDUSTRIAL NURSING UNDER BUSINESS DEPRESSION. *E. Whitty. Pub. Health Nurse, Dec., 1922, vol. 14, pp. 628-630.*

Industrial depression has been so acute in some places that it has been necessary to dispense with the services of the industrial nurse. On the other hand some industries have been but little affected. Between these two extremes lie many instances where the industrial nurse has been retained but her duties varied to suit conditions. This paper takes up the opportunities open to the nurse to show her versatility under such conditions.

One opportunity presented has been for the industrial nurse to make a thorough study of general business methods, costs, efficient management, the relation between wages and living conditions, and the promotion of better relations between employer and worker. She can thus correlate her own work better with that going on around her, and can take a more intelligent part in furthering legislation tending to the betterment of working conditions.

Supplementary work open to the nurse in times of depression includes clerical work; employment management; inspection of safety and sanitation; and supervision of bulletin board service, of lunch rooms, and of recreational or educational activities. Such work leads to chances for showing originality.

All these fields of work help the nurse to broaden her outlook and acquaintance and to be generally useful to employer and employee alike.—G. N. T.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

CONDITIONS OF HEALTH IN THE BOOT AND SHOE TRADE. *E. W. Burton-Fanning. Lancet, Jan. 13, 1923, vol. 204, pp. 108-109.*

In a lecture by E. W. Burton-Fanning delivered to the Norwich Shoe Trade Manufacturers and Foremen's Provident Association, the point was emphasized that personal inspection has revealed great improvement recently in buildings, hours, pay, and interest taken in the industrial welfare of shoemakers.

Yet tuberculosis is unduly prevalent; 145 shoemakers succumbed in comparison with 100 males of all occupations, or there were 456 deaths of shoemakers as compared with 100 of clergymen. Actual death rates per 1,000 living persons are 4.4 for shoemakers, 4.1 for tailors, 3.2 for clerks, 2.4 for engineers, and 1.0 for agriculturists. Poverty, excessive drinking, dust and cramped position are all rejected as causative factors. Lack of exercise, occupational selection of those physically unfit, fatigue, nerve strain, speed of work, and lack of fresh moving air, are held to be contributing influences. The distribution of cases in Norwich factories does not indicate that infection is of great importance. Working temperature should not be below 63° F. and should be maintained in the presence of fresh moving air without drafts. A test of adequate coolness should be the absence of visible sweating. A special shoe factory on hygienic lines is advocated for ex-sanatorium cases.—E. L. C.

A Note on the Causes of Output Limitation. *H. M. Vernon. Jour. Nat. Inst. Indust. Psychol., Jan., 1923, vol. 1, pp. 182-188.* (*Review by author.*)

The output of eighteen women pressing 6-inch tiles by means of hand presses was investigated for a fifty-eight week period. After the first four and one-half months, electric heaters were attached to the upper dies of the press, which prevented the clay powder from sticking. Consequently much less time was needed for cleaning, and over an hour a day was saved in the eight and one-half hour working day. The output improved but slowly, and it did not reach a nearly steady value for four months. This was due to the restriction of output practised by the women. Though they were on a straight piece rate, they seemed to prefer to limit their production to some agreed figure, and each week in the pre-heater period 30 to 70 per cent. of the outputs attained the same value—that is, 28.0. After the installation of the heaters, this limit was gradually abandoned, and a fresh one of 32.8 was substituted; but later it too was abandoned. It was thought that the chief reason why the women did not immediately improve their output when the heaters were installed was their fear that the piece rate of payment would be cut, though they were told by the management that this would not be the case. Another reason was the presence of a number of men in the workshop who influenced the women; the men were withdrawn shortly after the heaters were installed.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

The Efficiency Engineer and the Industrial Psychologist. *C. S. Myers. Jour. Nat. Inst. Indust. Psychol., Jan., 1923, vol. 1, pp. 168-172.*

The author contests Gilbreth's doctrine of "the one best way to do work." He considers that the psychological and physiological differences between individuals are such that it is useless to expect all to perform the same operations in precisely the same way. Such an aim is harmful in practice because it discourages initiative. Moreover, the quickest and shortest movements are not necessarily the least fatiguing. Contrary to Taylor, the author maintains that a factory depends, for its efficiency, upon the extent to which it is used as a training school and as a means of educating those who work there. The efficiency engineer is prone to regard human workers as machines, and to determine and set the tasks which may be expected of an efficient worker, regardless of the existence of factory worries, of discontent, and of other complicating conditions of a psychological character.

The author does not support Gilbreth's view that the psychologist "must not only make tests for himself, but must also see that such tests can be used by managers who are not psychologists." He thinks that the use of tests by one untrained in psychology has an extremely limited value. The psychologist has to consider, not only the numerical data afforded by vocational tests, but the way the worker carries out the test, and his entire personality.—H. M. V.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

Constructive Welfare Work in Modern Industry. *C. Smith. Jour. Roy. Sanit. Inst., Jan., 1923, vol. 43, pp. 188-194.*

The author traces the slow growth of industrial welfare work in Great Britain before 1914, its rapid progress during the war, and the post-war maintenance of the position gained. The outstanding landmarks have been the reports of the Health of Munition Workers' Committee; the practical application given to them by the welfare department of the Ministry of Munitions; the passage of the Police Factories (Miscellaneous Provisions) Act, 1916; and, since the war, the investigations of the Industrial Fatigue Research Board. The movement is yet young, but Great Britain stood alone at the First International Conference of Welfare Workers held in France in 1922, in offering a definite experience in legal welfare, although the United States had the biggest and most magnificent examples of voluntary work. Many orders have been made under the Act of 1916, and others are in draft. Such orders by compelling compliance effect advance; but more is gained where the spirit and not the letter of the law guides the work.

By demanding integration between employer and employed, welfare work confirms and develops good feeling. The day of paternalism is over in industry; the day of cooperation has begun.—E. L. C.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Medical Aspects of the Workmen's Compensation Law. *H. D. Sayer. Med. Times, Oct., 1922, vol. 50, pp. 256-259, 275.*

This is an address by the Industrial Commissioner of the state of New York. He emphasizes the position of importance which the physician occupies under the Workmen's Compensation law. The proof of a claim rests largely upon the signed report of the attending physician, and upon him devolves the responsibility of seeing that justice is done to the injured man. It follows that physicians' reports should be accurate and complete, setting forth the facts in detail so as to avoid any possibility of error. Keeping of proper records is essential, though sometimes irksome to a busy practitioner.

One source of friction under the law has been the practice of "lifting" cases. When a man is injured he has the right to request medical care from his employer. The latter either directly or through the insurance company chooses a physician with little regard for the wishes of the workman. The result often is that a physician is called in during an emergency, and soon receives a curt note from the insurance company stating that he will not be paid after a certain date, and that it proposes to substitute another physician for him. This practice has been heartily condemned by a representative committee selected by the commissioner to root out evils and to make recommendations for better cooperation under the law. This committee has made several suggestions designed to get the best results for the injured man.

The address is followed by an extended discussion of the subject from a number of different viewpoints.—G. N. T.

Comparison of Compensation Laws in the United States, as of January 1, 1923. *C. Hookstadt. U. S. Month. Labor Rev., Jan., 1923, vol. 16, pp. 158-169.*

In 1920 the Bureau of Labor Statistics made a comparison of the principal features of the workmen's compensation laws of the several states and territories. "This was published as Bulletin 275. Since then thirty-five jurisdictions have amended their compensation laws, while one new state (Georgia) has been added to the list of those having such laws. Arizona passed a new law in 1921, but this act was later declared unconstitutional by the state supreme court. Missouri has had a checkered career with its compensation legislation, and is at present without a compensation law. The state legislature enacted a law in 1919, which was invalidated by a referendum in 1920. The law was reenacted in 1921 and again invalidated by a referendum in 1922.

"The most important changes in compensation legislation since the publication of

Bulletin 275 were the consolidation of workmen's compensation commissions with other labor-law enforcing agencies, the reduction of the waiting period, and the increase in compensation and medical benefits, particularly the increase of the weekly maximum. More specifically, the following changes were made during the past three years: Five states added occupational diseases to the list of compensable injuries; seven states decreased the waiting period, and four states abolished the waiting period altogether in cases in which the disability extended beyond a certain period; five states increased the percentage; nineteen states increased the weekly maximum; thirteen states increased the medical benefits; and eight states increased the maximum amounts.

"At present forty-two states, the three territories of Alaska, Hawaii, and Porto Rico, and the federal government have workmen's compensation laws upon their statute books. These laws range widely as regards both coverage and amount of benefits provided. In attempting a comprehensible comparison of the various acts it is necessary to concentrate upon the more important features. These include the scope or coverage, compensation scale, length of time for which compensation is paid, maximum and minimum limits, amount of medical service provided, length of the waiting period, administrative system, insurance and type of injuries covered."—R. B. C.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

INCIDENCE OF SERIOUS MORBIDITY AMONG A GROUP OF WAGE EARNERS. *U. S. Pub. Health Rep., Dec. 29, 1922, vol. 37, pp. 3195-3203.*

By serious morbidity is meant disability from sickness and non-industrial accidents lasting at least one week. The cases are those for which sick benefits have been paid to members of certain employee sick-benefit associations and company relief departments reporting to the Public Health Service. The rates should probably be regarded as a minimum statement of the disabilities causing absence from work for a week or longer, on account of certain rules of some of the reporting associations which withhold benefits for disability from venereal disease, from certain chronic diseases contracted prior to date of joining the association, and from certain other causes of disability. There are also age limits for eligibility to membership in these associations. The results reported are for the calendar years, 1919 and 1920.

The seasonal fluctuations in the frequency of all diseases combined were fairly similar for both years except during August and September, when disease incidence decreased in 1920 and increased in 1921. In the frequency of serious digestive disorders there appears to be little seasonal variation; diseases of the circulatory system, however, exhibit a slight seasonal tendency, a diminished incidence being manifest in the summer and early fall of both years.

There were twenty-seven establishments reporting upon an average of 75,191 persons. The disease incidence in the various establishments showed wide variation. From the lowest rate (48 cases per 1,000 persons) to the highest (349 cases per 1,000 persons) is a range of more than 700 per cent. In one plant the sickness frequency rate for females was nearly 50 per cent. greater than the male rate; and on the other hand, there was a plant showing a lower rate for females.—B. C.

ATTEMPT TO SECURE UNIFORM MORBIDITY STATISTICS IN THE RHINE PROVINCES. *L. Teleky. Zentralbl. f. Gewerbehyg., June, 1922, vol. 10, pp. 149-154.*

A conference called consisted of two representatives from each of four chief associations of Sick Funds of Rhine Provinces and the regional industrial physician (Dr. Teleky). Expert statisticians and physicians were invited to the sittings. Attempt was made to lay a foundation for statistics which should be elaborate and comprehensive enough to serve for morbidity statistics—and yet with data so easily obtained that the Sick Funds could record them without any considerable outlay or other difficulties. The necessary forms and detailed instructions were to be furnished by the committee or by the Sick Fund Association.

1. Statistics were to be limited to those covered by compulsory insurance (this includes about 90 per cent. of the workers).

2. Individual occupations could not be included, since statements were not to be relied upon. Twenty groups were formed with the idea that where a certain industry in one of these included a large number of workers (*e.g.*, tobacco in the food handler group) a special sub-group should be made. An alphabetical catalog of industries was prepared to tell in which group each trade belonged.

3. Inasmuch as all the workers in large factories (Krupp, etc.) would be in one group, it was recommended that factory funds with more than 2,000 members should design sub-groups classified by occupation, after consulting their Fund Association.

4. Beside industrial grouping a sickness grouping was required. The large number of diseases on the official list made its use impossible. In order to show the external (industrial) factor, diseases from entirely different causes were not to be grouped together; on the other hand, diseases which might be mistaken for one another in diagnosis were to be grouped together. The following groups and classifications were agreed upon:

Group 1 covered general debility, anemia, and chlorosis.

Of the infectious diseases, tuberculosis and such conditions as hemoptysis and pleurisy were grouped as tuberculosis and suspected tuberculosis. Special groups were also made for grip and for venereal diseases. In certain regions where typhus or dysentery was epidemic, a special group might be required.

The classification "diseases of the heart and arteries" avoided the inclusion of hemorrhoids, phlebitis, and lymphatic infections in this group.

Stomach, bowel, and liver diseases formed a separate group.

Miscarriages and uterine hemorrhages were included together since the most frequent cause of hemorrhage in the industrial group is miscarriage.

Wound infections were classified with injuries, instead of being grouped according to the degree of infection.

Industrial poisonings formed a separate group. On account of their variety and their appearance only in certain funds, these funds were requested to report separately cases of poisoning, dermatitis, or other occupational diseases.

An alphabetical list of diseases was to be furnished telling to which group each disease belonged.

Six age groups were decided upon. Difficulties were encountered in determining the number of members of the various age and industrial groups; where there was marked seasonal variation, counts were to be made twice a year. Otherwise the figures of December 31 were to be used.

In addition a questionnaire explaining the prevailing economic condition of the district covered by the fund was to be filled out. This covered factors affecting the sickness rate, such as unemployment, relation of sick benefit to wages, medical system, and control.

Different forms were to be prepared for factory funds and for local town or county funds, each in the form to which they were accustomed—books, lists, or cards. All forms were to be supplied by the fund associations.

Only final diagnosis was to be used.

When possible, each fund was to prepare its own statistics and to supply the association and the regional industrial physician with a copy. In return they were to receive assistance in the study and interpretation of the material.

The author considers that this is but a beginning and hopes that others will also try new ideas and in this way aid in the development of an ideal universal statistical scheme. —J. W. S. B.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

VOLUME V JUNE, 1923 NUMBER 2

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GENERAL

A SELECTED BIBLIOGRAPHY OF BOOKS ON PUBLIC HEALTH. *Issued by National Health Council, Washington, First Edition, April 1, 1923.*

A selected list of books on public health has been issued by the National Health Council under date of April 1, 1923. This bibliography is intended to give to sanitarians and others interested much needed information as to the best books on the various phases of public health. The 175 books included are listed according to authors under fifteen headings: Administration and General Public Health, Cancer, Child and Maternal Hygiene, Communicable Diseases, Foods and Nutrition, Health Education, Industrial Hygiene, Laboratories, Mental Hygiene, Personal Hygiene, Public Health Nursing, Sanitary Engineering, School Hygiene, Social Hygiene, and Tuberculosis. The publisher, price and year of publication are also given and a list of public health magazines is appended. This list is a tentative one and it is hoped in a future edition to incorporate suggestions as to additions and changes and possibly to include annotations and a starred list. Single copies of the bibliography may be obtained from the National Health Council, 370 Seventh Avenue, New York City, without charge. Prices will be quoted on lots in quantity.

SOME HEALTH RISKS OF INDUSTRY. *F. J. Monaghan. Hosp. Management, March, 1923, vol. 15, pp. 68, 70, 72, 74.*

Industrial hygiene has reached a place of great importance in preventive medicine today because it deals with the health, welfare, and human rights of most of the population. It has centered attention on the waste in industry caused by sickness and the resulting drop in quality and quantity of work. Employers now generally appreciate that not only machines but the workers who run them must be kept at a high state of efficiency, and that this involves providing hygienic working

conditions. Our state and national laws, however, leave room for improvement and our worst conditions here still fall below the standards of the worst in Europe. Recklessness in handling trade poisons makes us compare unfavorably with England. For instance, the five largest factories in the United States making storage batteries reported a lead poisoning rate of 17.9 per cent. in 1914 as compared with a rate of only 2 per cent. for Great Britain in 1912.

The principal health risks in industry are given as follows:

1. Dust, either organic or inorganic, fumes, gases, vapors and acids, poisonous and non-poisonous.
2. Harmful bacteria causing infections.
3. Improper ventilation.
4. Improper lighting.
5. Extremes of temperature and humidity.
6. Excessive strain, leading to fatigue, etc.
7. Compressed or rarefied atmosphere.
8. Unguarded, poorly taken care of, or carelessly operated machinery.
9. Fire hazards.

These risks lead to such grave results as poisoning, pulmonary affections, anthrax, eye diseases, and the many types that make up the 500,000 serious industrial accidents occurring yearly, many of which are the results of fatigue. It is essential that the workers should be properly instructed in first-aid measures. A first-aid and minor surgical dressing room with a nurse in attendance should also be provided. Physical examinations to test the fitness of men for their work and to check up periodically on their condition should be made. Wherever there is danger of poisoning, employees should be instructed in the necessity of personal cleanliness, the danger of eating while at work, the advisability of using gloves and respirators, and of changing clothing before leaving work. Employers should do their part by providing good ventilation, eliminating dust, providing washing facilities and lockers for clothing.

"The results to an industry where the conditions of labor are hygienically satisfied will be (1) the lessening of labor turnover, (2) diminution of time lost, (3) increase of contentment and happiness of workers and (4) augmented wages earned and output attained.

"The most remunerative proposition in industry today, for both labor and capital, is attention to health in occupation."—G. N. T.

A New German Society for Industrial Hygiene. *Abstr. as follows from Dresdener Volkszeitung, Oct. 27, 1922, in Internat. Labour Rev., Jan., 1923, vol. 7, pp. 122-123.*

On September, 1922, took place a meeting of scientists, hygienists, and representatives of employers and workers at the University of Leipzig to discuss the formation of a society having for object the fight against industrial diseases and accidents. The history of industrial hygiene was traced by Professor K. B. Lehmann, who showed how imperative the necessity of this branch of general hygiene has become with the progress of industrial technic. The chemical industry, in particular, requires the assistance of doctors and hygienists to protect the life and health of its workers. Among the sources of danger in this industry are X-rays, ultraviolet rays, heat, dust, and other similar factors.

The recommendation of prophylactic measures, however, is not enough; the worker must apply them and must know how to make use of the protective equipment which the employer may place at his disposal. In order to combat the ignorance of the working classes lectures should be given in schools, and articles bearing on the subject written for their instruction should be published in the trade union press. Reliable statistics are also indispensable to an adequate development of industrial hygiene.—M. C. H.

Hygienic Working Conditions in the Coral and Allied Industries. *Bazzano. Il Lavoro, Nov., 1922, vol. 13, pp. 340-343.*

On account of the decline of the coral industry (including mother-of-pearl, shell, and ivory) during the war, and the development of this industry in Japan and India, there are employed in this trade in Italy at present only a few hundred workers.

Ten workshops were studied by Dr. Coppa of the Naples Industrial Clinic. Conditions found were either dryness, in rooms where considerable heavy dust was produced, or humidity in cutting and polishing with wet wheels.

In cameo production from shells the work is individual and artistic and not productive of morbid conditions. Coral work includes polishing and carving. After selection, fragmentation, and sifting of sizes, the fragments

are bored, strung, and polished. Carving requires artistic ability; it is usually a hereditary art which is now becoming lost.

The prevalent diseases among these workers are cramps and myalgias of limited groups of muscles subjected to monotonous movements or rigidity of position. On account of the moist atmosphere in which they work burnishers are subject to acute or chronic articular rheumatism. Next in importance are respiratory affections, not severe pneumokonioses but usually bronchial catarrh and irritation of the upper respiratory mucosa, which may predispose to tuberculosis. Due to their cramped posture and delicate work the carvers suffer especially from irritability, neurasthenia, and eyestrain. In addition there are calluses definite enough to be considered trade stigmata.—J. W. S. B.

UNEMPLOYMENT AND PUBLIC HEALTH. *R. J. Ewart. Jour. Roy. Sanit. Inst., Feb., 1923, vol. 48.*

Unemployment at first aids health by rest from laborious toil, then harms it by lack of wages. If the standard of life—that is, the value of real wages—has been high, the relationship between unemployment and health may be masked for some time. Real wages are now twice their value in 1850. Control of disease, such as smallpox, has rendered industrial development possible; but food supply is the potent factor in public health. State relief maintains today a higher health standard than that of 1850, but it is not economically or physiologically sound to give doles without asking for work in exchange. Data of great importance for the period 1851 to 1921 are given, showing infant and general mortality, real wages, unemployment, and phthisis death rate. Insurance is advocated against personal ill health and accident, against seasonal fluctuations in employment, and against national fluctuations. Relief work, carefully planned beforehand, is needed; it should be graded and continuous, not broken; but wages paid should be lower than ordinary wages. Much information and thought are unduly condensed into this important article.—E. L. C.

APPLICATION OF THE THREE-SHIFT SYSTEM TO THE IRON AND STEEL INDUSTRY. *Internat. Labour Office, Studies and Reports, Series D, No. 3, 1922, pp. 156.*

At the suggestion of the Taylor Society of the United States, an organization composed of engineers, production managers, and labor managers, the International Labour Office made up a questionnaire on the subject of the three-shift system. This questionnaire was sent to the governments of the States Members of the Organization, and to representative associations of employers and workers. The inquiry was limited to blast furnaces, open hearth furnaces, Bessemer converters, and rolling mills. It was desired to bring out the following information:

1. The extent to which the three-shift system had displaced the two-shift; the circumstances and date of the change; and the opinion of employers and workers on the effect of the system.

2. The change in the number of men, output per man per day, quality of product, consumption of materials, labor cost, and total cost, consequent upon the substitution of the three-shift for the two-shift system.

3. The effect of the three-shift system on the health, accident frequency rates, energy, and interest of the worker; the use made by the workers of their greater leisure.

4. The arrangement of shifts adopted in order to give each worker one day's rest each week; any improvements in the technic for carrying through the change of shift-system which have been suggested by recent experience.

The replies have been published in full in this report. These replies were received from seven governments, associations of employers in twelve countries, and associations of workmen in four countries.

In every country of Europe where the steel industry is of any importance the three-shift system has been adopted. The change to it from the old two-shift method came shortly after the war, except in England where a few firms had adopted it some years before. Since most of the replies received were based on experience with the three-shift system covering only from one to two and one-half years, they indicate few conclusive results. The after-effects of the war, such as mental and physical exhaustion due to that struggle, the spirit of unrest, dearth of raw materials, underfeeding, and numerous other

abnormal factors all prevented reaching reliable conclusions. In fact this report is mainly distinguished by its frank admission of presenting meager and often contradictory information. Especially is this true of the effect on the workers' health; some employers complain that workers exhaust themselves by using their spare time in additional outside work, useless pleasure, or industrial agitation, while workers claim greater energy and a wholesome use of the time.—G. N. T.

INTERNATIONAL LABOUR DIRECTORY, 1923. *Internat. Labour Office, Geneva, 1923.*

This International Labour Directory aims at giving, in a concise form, full and accurate information as to official institutions and national and international organizations which deal with labor and industrial questions throughout the world. The sources of information are the governments or organizations concerned, wherever possible.

The first section contains a short account of the constitution of the International Labour Organisation and of the League of Nations. The second gives a list of government departments, public offices, official commissions and boards, etc., which deal with labor and industry in different countries, together with an outline of the organization and functions of each department or office, the names of the responsible officials, and particulars of official publications. The third and fourth sections give in tabular form lists of the most important national and international employers' and workers' organizations. The fifth and sixth sections contain tables of national and international organizations of intellectual workers and of ex-Service men, respectively. The seventh section contains lists of the most important operative organizations of various kinds, including international organizations, confederations of international order, federations of a regional character, societies and associations. The eighth section contains a list of miscellaneous international organizations which deal, more or less directly, with questions of interest from the point of view of industry and labor.—M. C. H.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

TUBERCULOSIS AND POISON GAS. *A. P. Francine. Abstr. as follows from New York Med. Jour. and Med. Record, Jan. 3, 1923, vol. 117, p. 25, in Am. Rev. Tuberc., March, 1923, vol. 7, p. 21.*

Mustard gas is the only gas considered because it was almost exclusively used against the American forces, as it is the most effective of all battle gases in producing casualties. In reality, the so called mustard gas is not a gas but is a heavy oil thrown in shells. Great extent of terraine can be contaminated for long periods of time. It volatilizes with difficulty and only under warm sunshine. Any troops going into such areas are burned (gassed). It is usually not inhaled. Other types of gas, like phosgene and chlorine, are vastly more deadly, but are only effective in such high concentrations; hence, in such a restricted area as to be very ineffective as compared to mustard gas. Chest examination of those gassed by mustard gas usually revealed nothing. Except in a relatively few cases, there was no possible relationship between the lung condition found and exposure to the gas. The percentage of deaths in the gas hospital was 1.98 per cent., all from mustard gas. In those cases autopsied no evidence of reactivation of existing tuberculous lesions was found. It seems, however, true that a man who has since been gassed has come to attribute any illness from pain in the chest, shortness of breath, acute bronchitis or tuberculosis, to his gassing. Yet it is inconceivable that gas could reactivate tuberculosis, and available statistics and majority expert opinion go to prove that it does not do so. This view is endorsed by French, British, and other authorities.—M. C. H.

CASE OF CHRONIC HYDROCYANIC ACID POISONING. *J. Rosenbloom. Abstr. as follows from Jour. Lab. and Clin. Med., Jan., 1923, vol. 8, p. 258, in Jour. Am. Med. Assn., Feb. 24, 1923, vol. 80, p. 581.*

Loss of energy, vomiting every meal shortly after its ingestion, and secondary anemia, Rosenbloom says, are the earliest symptoms of chronic cyanid poisoning.—K. R. D.

THE PATHOGENESIS OF MERCURIAL STOMATITIS: WITH A REVIEW OF THE LITERATURE ON MERCURY POISONING. *D. H. Bessesen. Arch. Dermat. and Syph., March, 1923, vol. 7, pp. 332-362.*

The author concludes with the following summary:

1. In looking up the literature on mercurial stomatitis, I was surprised to find that the explanations advanced for the mouth lesions were apparently too narrow when all known lesions are taken into consideration.

2. The nine principal theories of the action of mercury on the body are briefly summarized.

3. The essential literature on the pathology of mercury poisoning is analyzed under the system of organs affected, in order to see whether the known facts indicate any general underlying effects which might be involved in local lesions, such as those that occur in the mouth.

4. From the foregoing analysis, it is evident that there are distinct indications of blood and circulatory changes which must be taken into consideration in discussing any local lesion.

5. The results of examining a large number of sections from tissue taken from cats and ferrets with mercury lesions are recorded. These results and their interpretations are fully in harmony with those deducted from an extensive review of the literature.

6. Finally, in connection with the pathogenesis of mercurial stomatitis, I believe that the general systemic action is answerable for the lesions in the same degree as the local changes.

TAR ACNE AND TAR CARCINOMA. *Fischl. Arch. Dermat. and Syph., April, 1923, vol. 7, p. 565.*

In a paper presented at the Vienna Dermatological Society Dr. Fischl cited a case of tar acne and tar carcinoma occurring in a laborer who worked with tar. There was tar acne on the face and a cherry-sized carcinoma on the prepuce.

A CHEAP AND EFFECTIVE METHOD OF DEALING WITH TYPE-METAL DROSS IN PRINTING OFFICES WHERE A CLOSED RECEPTACLE UNDER HOOD IS NOT AVAILABLE. *Reprinted from pamphlet issued by Health Committee with approval of Joint Indust. Council of Printing and Allied Trades, London.*

If the dross from any type-melting pot be examined a quantity of very fine and light black dust will be seen. This black dust will also be found on shelves, ledges, and floor in the vicinity of the melting pot. It is this dust which is of a poisonous nature and the main cause of lead poisoning. If the following method be carried out, the danger of poisoning may be reduced to a minimum.

The skimmings from the melting pot should be placed directly into, say, a 12 or 24 pound old ink tin, which should have the lid replaced immediately after the skimming is completed. The tins when full should be carefully sealed up and sent packed in a box or other container direct to the metal refiner.

The contents of the tin, once it is filled, should not be transferred to any larger vessel so that the danger from escaping dust may be avoided. It is highly dangerous and not economical for the printer to attempt to extract further metal from the dross by re-melting. The fine dust left after re-melting is very poisonous.

The shelves, ledges, and floor of the room should be regularly cleansed by vacuum cleaner and the dust transferred into water and passed down the drain.

MELTING TYPE-METAL

Wherever practicable type and stereo metal should be melted in a pot with hood attachment connected by means of piping with a fan capable of extracting the fumes and fine dust coming from the molten metal. The skimmings from the melting pot should be put into an iron receptacle placed on a stand close to the melting pot and immediately under a hood connected by means of piping with the fan exhaust. The metal receptacle should have a lid made to slide backwards when required, and it should always be kept closed when not in use. [A diagram illustrates the general idea.] The same method of removing the poisonous black dust from shelves, edges, and floors as previously mentioned should be carefully observed.

In newspaper and other offices where linotypes are operated it is most desirable that the cleaning of plungers should be done in a dust-proof plunger-cleaner or under a hood connected with fan exhaust.

Cleaning Type Cases

The dust in these should never be blown out by means of bellows, either within the building or even outside. It can be easily and efficiently extracted by means of a vacuum type-case cleaner. There are several cheap and efficient machines on the market.

Personal Precautions to Be Taken by All Who Handle Type or Who Are Engaged in Handling or Melting Metal

Always thoroughly wash the hands before leaving the works or before taking food or drink.

The teeth should be thoroughly brushed twice a day.

Basophile Granulations and their Diagnostic Value in Lead Poisoning. *Cavagliano. Il Lavoro, Dec., 1922, vol. 13, pp. 371-372.*

The author refers to the experiences of Aiello with Schwarz's thick drop method. In studies of guinea-pigs the basophile granulations appeared from eight to ten days after the beginning of the experimental poisoning. When basophilia is present it is easily recognized in thick drop smears but in doubtful cases there is great possibility of error.

He summarizes the opinions of the writer as to the diagnostic value of basophile stippling, and concurs in the opinion that the stippled red cells are merely immature forms liberated from the bone marrow.—J. W. S. B.

Lead Poisoning among Printers—How Caused and How Best Prevented. *T. M. Legge. Reprinted from pamphlet issued by Health Committee with approval of Joint Indust. Council of Printing and Allied Trades, London.*

Lead poisoning is a risk in the printing industry, but not a great one when the number of persons employed is borne in mind. All reported cases are followed up to find out the cause which can quite definitely be said to be due to the inhalation or breathing in of either dust or fume containing lead. Thus in the last twelve years there have been 230 cases—98 compositors, 55 stereotypers, 20 linotypers, 14 monotypers, 2 electrotypers, and 41 other persons mainly employed in the foundry. Of this total 160 cases of poisoning occurred in ordinary letterpress printing, and 70 in newspaper printing works. But the most remarkable thing is that no fewer than 185 factories were involved, which means that the conditions exposing to risk of lead poisoning must be pretty much the same in nearly every printing works in the country.

Every reported case, it should be remembered, means others who are suffering from the effects of lead in a less degree.

Dust of metallic lead or the oxide of lead (the most dangerous form) given off in drossing or brushing the plunger of the lino pot, if absorbed even in small quantities, has a tendency to remain in the system. Unless, therefore, constant care and cleanliness are observed lead will go on accumulating so that in time health may become damaged without the occurrence of any definite attack recognized as lead poisoning. The average age of printers when attacked is 38 and the duration of employment fifteen years.

The symptoms in the printer are usually colic and less frequently "drop wrist," but the possibility of a slow undermining of the constitution from the action of lead on the blood vessels and kidneys (chronic Bright's disease) must be remembered.

Handling of type metal and fresh type is harmless. The compositor gets his lead poisoning from the dust in the type cases; the stereotyper and foundry worker from drossing the molten metal, careless dumping of the dross on the floor and subsequent sweeping up and bagging operations; and the linotyper from brushing the plunger, and possibly from the fine dust of metallic lead which drops down from the matrices as these are removed after contact with the slug. Finally, the debris on the floors is a cause. As lead never enters the system directly through the skin, poisoning can be prevented in printing works by avoiding the raising of dust.

It is to the interest of everyone to see that ventilating arrangements are as good as they can be for carrying away, at the point they are produced, dust and fume in the foundry and stereo department, and that proper trays are in place under linotype and monotype machines and circular saws.

See that the dross is kept in a receptacle under the same hood as the melting pot, or, if that is impracticable, at any rate in a receptacle with a lid. Never dump it on the floor.

Although the temperature of the lino and mono pots is not high enough to give off lead fume, ventilating hoods and ducts, in connection with a fan, serve a threefold purpose: first, in taking away the gas and oil fumes; secondly, in keeping down the temperature of the room and so making working conditions comfortable; and thirdly, in tending to draw away lead dust in the air.

Nowadays with either a dust extractor for compositors' cases in large works or a vacuum cleaner in small works, and with dust-proof plunger cleaners available, there is no excuse for blowing the type cases out with bellows, or for wire-brushing the plunger in the open shop.

A worker can do much to keep fit and so make his system more resistant to lead absorption than it otherwise would be. He should pay scrupulous attention to cleanliness of the hands and teeth. Too much stress cannot be laid on the part played by bad teeth in lowering the health. The habits of the workers, intemperance and disregard of the simple rules of health, as no one will need to be told, influence liability to lead poisoning.

Medical advice should at once be sought if signs of lead poisoning present themselves. Wrist drop will always incapacitate a man for months, and may prove permanent unless electrical treatment is obtained in time.

PROTECTION IN RADIOLOGY. *G. E. Pfahler. Abstr. from Am. Jour. Roentgenol., Dec., 1922, vol. 9, p. 803, in Jour. Radiol., March, 1923, vol. 4, p. 96.*

General recommendations of the committee on X-ray and Radium Protection in England are as follows: "It is the duty of those in charge of x-ray and radium departments to ensure efficient protection and suitable working conditions for the personnel. The following precautions are recommended: (1) Not more than seven working hours a day. (2) Sundays and two half-days off duty each week, to be spent as much as possible out of doors. (3) An annual holiday of one month of two separate fortnights. (4) Sisters and nurses, employed as whole-time workers in x-ray and radium departments, should not be called upon for any other hospital service."

"Dr. Pfahler recommends that the American Radium Society appoint a committee known as the Committee for Protection in Radiology, to cooperate with the Safety Committee of the American Roentgen Ray Society, together to formulate certain problems to be worked out by the Bureau of Standards at Washington, D. C.

"He discusses briefly the protection of the patient, and the protection of the radiologist against loss and against unjust claims. The present loose system which allows men to practice radiology without proper preparation does much to bring the specialty into disrepute, for many legal claims arise from the mistakes of unqualified workers and the public does not discriminate. This state of affairs can and should be remedied."—M. C. H.

DUST HAZARDS AND THEIR EFFECTS

COLLECTION AND EXAMINATION OF EXPLOSIVE DUSTS IN AIR. *L. J. Trostel and H. W. Frevert. Jour. Indust. and Engin. Chem., March, 1923, vol. 15, pp. 232-236.*

The method used by the authors consists of filtering through a "single-thickness, Whatman 33 x 94-mm" paper extraction thimble held in a simple form of brass capsule. The source of air suction is a lung-motor foot pump or a small universal motor suction fan equipped with a Venturi meter and inclined manometer. The filter is dried to constant weight, by tare, under a vacuum, the dust is then collected, and the increase in weight of the filter gives the amount of dust collected for the volume of air sampled. A small piece of loose cotton is placed in the thimble so that a portion of the dust is caught on it and does not clog the filter. The efficiency of the latter increases notably, however, after about thirty seconds.

From the practical standpoint the device is compared with the sugar tube and the Palmer apparatus. Since the dust cannot be ignited or washed free of sugar, the sugar tube method is not applicable. As contact with water over extended periods is not permissible, the Palmer apparatus is considered unsatisfactory.

The simplicity of the technic of sampling

is emphasized and the device has been found by the writers to be applicable to field conditions in which starch dust was encountered in concentrations greater than 25 mg. per cubic foot.

The size of the particles in the explosive dusts examined is given as 15 microns and was determined by measuring samples taken from the thimble and subjected to 100 to 200 diameters magnification.

A pertinent bibliography of twelve references is appended.—P. D.

Microscopy of Paint and Rubber Pigments. *H. Green. Chem. and Metall. Engin., Jan. 10, 1923, vol. 28, pp. 53-57.*

Further applications are given of the author's photomicrographic method of studying pigments. The method is applicable to studies of dust and other particulate matter of hygienic interest. A brief but pertinent bibliography is included in the paper.—P. D.

Dust in Milling Plants. *M. W. von Bernewitz. Abstr. as follows from Eng. Mining Jour. Press, 1922, vol. 114, pp. 1070-1071. in Chem. Abstr., Feb. 10, 1923, vol. 17, p. 373.*

Suggestions for dust reduction.—P. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

Pneumonia among Industrial Workers. *E. B. Starr. Ohio State Dept. Health, Nov.-Dec., 1922, vol. 13, pp. 194-196.*

Pneumonia should be regarded as the most important of infectious diseases among industrial workers because of its high mortality rate. Lobar pneumonia causes the most deaths in middle life, while with bronchopneumonia the highest mortality occurs in the extremes of life. Studies made by the United States Public Health Service, the Metropolitan Life Insurance Company, and other agencies prove pneumonia to be an important cause of morbidity and of absenteeism, especially among males. Occupations which subject the workmen to sudden changes of temperature, such as iron molding, have the most pneumonia cases. A study by the author of deaths among 52,000 Ohio coal miners in 1918 revealed a death rate of 863 per 100,000 in comparison with 635 among males of 15 years of age and over in the state at large. In this study, the age period most affected was 25 to 34 years, 60 per cent. of deaths in that period being due to influenza-pneumonia. The occurrence of pneumonia as a terminal event in industrial poisoning and as a consequence of overcrowding and poor ventilation in factories and homes is well known and should be guarded against.—G. N. T.

Industrial Tuberculosis. *Tubercle, March, 1923, vol. 4.*

This number is devoted entirely to industrial tuberculosis. In addition to the main article which is reviewed in the next abstract, it contains a short note by C. L. Sutherland on experiences at Oughtibridge, Yorkshire, of the Refractories Industries (Silicosis) Scheme, 1919. He points out that while sixty-four men, or 5 per cent. of the 1,254 men examined, were found with silicosis or tuberculosis, the proportions varied from 13.95 for setters, 13.33 for miners, and 9.21 for breakermen, to 2.43 for quarrymen, and 2.21 for laborers in sheds. Reasons are given for considering even these figures too low. The sixty-four pathological cases were classified as follows:

	Certificate of Suspension Issued	Totally Disabled	Deaths
Silicosis alone.....	30	10	2
Silicosis plus tuberculosis	6	6	10

This issue of *Tubercle* also contains a valuable bibliography on tuberculosis in relation to industry, and two pages of interesting statistics. The abstracts and critical reviews, which are always a feature of this journal, deal entirely with recent papers and publications regarding different aspects of industrial tuberculosis, and we note that most of the work dealt with was published in the United States. This issue of *Tubercle* is one to which the attention of our readers is particularly directed.—E. L. C.

The Influence of Industrialism upon the Age Incidence of Phthisis. *E. L. Collis.*

Tubercle, March, 1923, vol. 4, pp. 241-255. (Reviewed by author.)

Records of mortality from tuberculosis, distributed by age periods and gathered from different nationalities, are presented in this article; early and late records for Sweden, Ireland, Scotland, England, and Wales are quoted; records for Czechoslovakia, Prussia, and the United States are also instanced. The age of the maximum incidence of the disease is shown to have been different at different times in the same country. The author suggests that the order of events is as follows: In a settled community in which phthisis is endemic it mainly concerns late ages; any influence, such as industrialism, which, by disturbing habits and customs, alters the resistance of the community to disease, causes the maximum incidence to appear in young adult life from which it retires again to late life as the community settles down physiologically. By appeal to phthisis mortality in rural and urban districts, as it affects males and females, the claim is made that the influence of industrialism is particularly associated with occupational life. This claim is supported by appeal to the way in which phthisis occurred among females when they were suddenly called into industry during the war; an interesting diagram shows that the rise in mortality, which occurred, was concentrated on early adult life and did not extend beyond the age of 35. American data are quoted in support of this; they also show that males in the Registration States are apparently settling down to conditions of modern life faster than in the United Kingdom, since already the age of maximum incidence of phthisis mortality among them is as late as 60 and over.

Occupational records for England and Wales are instanced and are held to show how the move of maximum incidence to late life may be retarded by indoor sedentary life, or by the alcoholic habit, and how it has taken place most rapidly in those occupations which have been least disturbed in recent years. The move appears to occur irrespective of the total phthisis death rate in any occupational group.

The conclusion is reached that resistance to phthisis, particularly in early life, seems to depend upon the extent to which the race has suited itself to its environment; while the degree of mortality experienced appears to depend rather upon aggregation of population, which probably affords opportunities for infection.

THE HIGH RATE OF TUBERCULOSIS IN INDUSTRY. *F. S. Kellogg. Nation's Health, Feb., 1923, vol. 5, pp. 103-105.*

General figures for the incidence of tuberculosis cannot be applied to special groups. The favorable showing of sheltered groups offsets the unfavorable and even alarming conditions of others living and working under adverse circumstances. Though the general mortality from tuberculosis in Vermont, for example, has been reduced one-half in the last twenty years, the mortality from this disease among Vermont granite workers has tripled. Tuberculosis surveys of individual industries must be made if we are to determine the true incidence of the disease in a given group.

The control of tuberculosis in industry depends upon the thorough organization of industrial medical work.—K. R. D.

PREVENTION OF TUBERCULOSIS. *W. M. Crofton. Jour. State Med., Feb. 23, 1923, vol. 31, p. 74.*

Starting on the assumption that "every member of the community attaining adult years is, or has been, infected by tubercle bacillus," Dr. Crofton alludes to the colossal character of the prophylactic task. He admits that the provision of a pure milk supply, institutional isolation of tuberculous patients (requiring for the British Isles at least 300,000 beds), and improvement of hygienic surroundings, may be of some use; but insists that there is only one certain method of ensuring success, namely, the immunization of every individual in the community with an antigen of the tubercle bacillus.

The two objections to his plan are (1) the danger of application and (2) failure of effect.

(1) All danger is now eliminated by using the modern method of prophylactic inoculation. The disasters attending Koch's original tuberculin method were due to his amazing misconception of the action of microbial antigen.

(2) Failure is found only in the laboratory, where excessive doses of bacilli are in-

jected into the blood or peritoneum or under the skin. Such conditions never obtain in the human individual. Success is certain both as to diagnosis and treatment if the proper practice is pursued. Though not mentioned in this article, a further objection is that even if the advisability of such universal inoculation should be conceded, the difficulty of enforcing it would be almost insuperable, at any rate in most industrial communities.

Dr. Crofton advises the use of an antigen composed of a solution of tubercle bacillus in benzoyl chloride H. T. S. and claims that "it is undoubtedly the most potent microbial antigen which has ever been discovered." It can be given in doses from 0.00000001 mg. minimum to 0.1 mg. maximum, according to the age and vigor of the patient.

Scientific literature of this character is required to combat the prolific and specious advertising of nostrums which, by encouraging delay, add danger to the disease and raise hopes destined to be falsified by results.—D. A. C.

AN INVESTIGATION INTO THE DISTRIBUTION OF PULMONARY TUBERCULOSIS IN THE WEST RIDING OF YORKSHIRE. *J. B. McDougall. Tubercle, Jan., 1923, vol. 4, pp. 145-160.*

The prevalent type of phthisis found in the West Riding of Yorkshire is the middle-aged type; but the West Riding of Yorkshire consists of three districts, occupationally distinct—one is agricultural, another, coal-mining, and the third, woolen-textile. Differences are found in the phthisis mortality rates of different age groups in these districts. In the coal-mining district the mortality is low throughout life, except for one area, Rotherham, where the mortality under the age of 15 is exceptionally high; this high child mortality is attributed to bad atmospheric conditions dependent upon the industrial nature of the area. In the textile district the mortality is comparatively high late in life. Certain particular localities are affected owing to sandstone quarrying which gives rise to a phthisis death rate of 16.7 per 1,000, in comparison with 1.0 for coal miners. Other industries in the West Riding with special influence upon the occurrence of phthisis are the following: ganister work in the Don Valley, glass-bottle making at Ferry Bridge, pottery at Knottingley, and steel grinding at Sheffield. No statistics confined to these industries are, however, given. The author particularly advocates open-air schools for the children, and such factory hygiene as that which includes routine medical examination of all workers, together with healthful ventilation and the prevention of infection.—E. L. C.

EXPERIMENTAL TUBERCULOSIS IN RATS ON VARIED DIETS: PROTEIN AND SALT FACTORS. *L. B. Lange and N. Simmonds. Am. Rev. Tuberc., March, 1923, vol. 7, pp. 49-57.*

"Four series of rats were infected with bovine tubercle bacilli by subcutaneous inoculation into the groin and the progress of the infection was studied at intervals of from one week to five months after infection.

"Three series were on diets of varying protein content, adequate, high and low. No significant difference was noted in the reaction to infection in the three groups, either in the general condition and weight curves or in the gross and microscopic autopsy findings.

"The fourth series was on a diet deficient in salts but otherwise adequate. These animals showed a more diffuse and extensive local reaction at the site of inoculation, a slower dissemination and a slower elimination of the lesions.

"In all four series there was a high resistance to tuberculous infection. As far as it went, the reaction was similar in character and progress to that found in less resistant animals, but the process never advanced in any of the sixty-six infected animals of this experiment to extensive necrosis. Instead, the invading bacilli appear to be overcome directly rather than to be merely walled off. No instance of connective tissue encapsulation was observed. Instead, there was slow shrinkage and absorption of the tuberculous tissue accompanied by disappearance of the tubercle bacilli."

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

A BRIEF FOR THE MORE ACCURATE CLASSIFICATION OF INDUSTRIAL SKIN DISEASE. *C. G. Lane. Arch. Dermat. and Syph., Jan., 1923, vol. 7, pp. 77-80.*

"The adoption of the term 'dermatosis industrialis' in the diagnosis of pathologic skin conditions from industrial causes is urged, to be employed in conjunction with two qualify-

ing terms, one signifying the type of eruption and the other the causative element, if known, or the occupation if the exact cause is not known.''—M. C. S.

INDUSTRIAL DERMATITIS AT THE MASSACHUSETTS GENERAL HOSPITAL. *C. G. Lane. Arch. Dermat. and Syph., Nov., 1922, vol. 6, pp. 565-572.*

The following conclusion is given:

1. Seven per cent. of dermatitis venenata and eczema, or almost 3 per cent. of all admissions to a skin clinic in a large hospital, were occupational in origin.

2. It is fair to estimate that 4 or 5+ per cent. of admissions to a skin clinic may be occupational.

3. A more careful study should be made of the individual patient.

4. A more exact study of trade processes should be instigated in case of questionable eruptions on exposed surfaces.

5. The consideration of preventive measures should be a greater factor as we see these cases in the clinic.

6. Some name, such as ''dermatitis industrialis,'' or at least a more accurate place in our nomenclature, should be provided for this definite etiologic group of cases.—M. C. S.

THE NATURE OF ECZEMA. *H. Jaeger. Ann. de dermat. et de syph., Jan. and Feb., 1923, pp. 10-34, 109-129.*

The writer conducted a large number of experiments in order to ascertain whether eczematous and certain other diseased skins are differently, or more readily affected by external agents, than are the skins of normal persons. The principal chemicals tested were: formalin 4 per cent., oil of turpentine, and tincture of arnica. Lint saturated with one or another of these solutions, under an impervious dressing, was fixed to the healthy skin of 140 persons for twenty-four hours; when the dressing was removed the results were noted. In like manner seventy-seven patients suffering from eczemas of different types were selected and the sound parts of their skins subjected to an identical routine. The following facts were elicited.

Only 4 per cent. of the skins of normal persons showed any reaction to these chemicals. On the other hand, of the eczematous sufferers 51 per cent. developed on the sound part of their skins a marked eruption. Macroscopically and microscopically the lesions were indistinguishable from an acute vesicular eczema. A few did not advance beyond the erythema stage. Of the healthy areas on the skins of a few invalids affected with a variety of lichen and submitted to the same experiments, 10 per cent. broke out with an eczematous rash. Of the seborrheic cases similarly treated only 8 per cent. acted positively.

Jaeger regards this marked irritability of the eczematous skin to chemical agents as an hereditary or acquired individual character. He thinks that it probably arises from the same weakness or tendency which causes ideopathic eczema. He concludes that its seat is more likely in the cells of the skin—a tissue idiosyncrasy, rather than a blood or lymph defect.

This paper may be helpful from the light which it throws upon the incidence of occupational dermatoses.—R. P. W.

FINAL REPORT OF THE DEPARTMENTAL COMMITTEE ON THE CAUSES AND PREVENTION OF BLINDNESS. *Ministry of Health, H. M. Stationery Office, London, 1922.*

Blindness and impairment of vision due to industrial causes may be the result of either disease or accident. Apart from miners' nystagmus, disease is a small factor in causing blindness, but the amount of injury to vision caused by accident is considerable, and is accentuated by sympathetic ophthalmia. Eye accidents in mines and quarries, reported in 1920 and causing absence of more than seven days, numbered 4,869, and of these 4,340 involved loss of 18,000 weeks, or an average of about four weeks per accident. Similar information for factories and workshops is not available but the committee states that the loss of time was evidently considerable. A return furnished by the Scottish Board of Health showed that, of 5,515 blind persons of all ages on the Scottish Register of the Blind in April, 1922, there were 426, or 7.2 per cent., whose blindness was due to accidents occurring in their occupations. An analysis of 2,000 cases from the Register of the Blind for England and Wales made in 1918 showed that 12.3 per cent. attributed their blindness to accident. This figure, however, included military cases, and cases of accident occurring in civil life. An investigation was made of records of eye accidents at hospitals in London, Manchester, Newcastle, Glasgow, and

Edinburgh. Of about 3,700 records of in-patient eye accidents examined, 2,336 were reported as industrial accidents.

With regard to liability to eye accidents in industry, Mr. McBride suggests that it may be assumed that in general one workman in thirty meets with an accident a year and one workman in every 1,287 meets with an accident involving injury to the eye. "It is, however, not possible to show in detail the relative risk of eye accident in the different industries." Regarding liability to eye accidents in industry, the Committee states that it is to be noted "that the percentage of eye accidents to all accidents by itself affords no basis for the comparison of the degree of risk between one industry and another. Such comparison requires in each case a knowledge of the proportion of accidents to the number of persons employed." Further, the committee is unable to show in detail the exact amount of loss or impairment of vision caused from year to year, and considers this a serious gap in the information regarding accidents. It suggests that the deficiency might be remedied by the aid of the insurance companies, and recommends that as soon as the proposals for pooling the information in their possession regarding accidents have matured, the information should be made available to the government departments concerned.

Industrial Diseases Affecting Eyesight

The principal industrial diseases which affect eyesight are certain forms of poisoning, the special form of cataract which is liable to attack glass and iron workers, pitch ulceration, and miners' nystagmus. Apart from miners' nystagmus, it will be found that the number of cases of serious impairment of vision caused by these diseases is probably very small.

Poisons

Lead.—Particulars are given in the report of cases of lead poisoning supplied to the committee by Dr. T. M. Legge, who stated that he had no knowledge of the occurrence of blindness in any of the cases of neuritis given in the tables supplied by him. He reported that "the prevention of visual impairment and blindness due to lead poisoning is involved in the prevention of lead poisoning in general. The dangers of the latter are so great that stringent precautions are in force and the industries concerned may be regarded in this respect as well under control."

Miscellaneous.—The committee also considered the toxic effects giving rise to optic neuritis from the derivatives of benzene, trinitrotoluene, methyl alcohol, and carbon bisulphide. "The dangers to eyesight are, however, serious, and it is to be noted that the relative immunity from grave eye injury is dependent on the maintenance of the stringent precautions which are taken."

Affections of the Eye in Processes Involving Exposure to Intense Light and Heat

Glass Workers' Cataract.—The committee refers to the Report of the Royal Society's Committee on this disease, and summarizes the conclusions already reached by this committee, which expressed the opinion that if workers wore spectacles made of the appropriate glass the disease would be abolished. Dr. Legge, who gave evidence before the committee on this subject, considered that prevention was rather to be looked for in the machinery of glass-bottle making, which has in recent years begun to replace hand operations.

Iron Workers' Cataract.—"The form of cataract found among glass workers is not confined to the effects of glass making furnaces. The same form of cataract has been reported among puddlers, chain belt makers, and tin makers. . . . Prevention in these cases is at present only to be looked for in the use of appropriate glasses."

Miners' Nystagmus.—The most important of industrial diseases affecting eyesight appears to be nystagmus. In 1920 there were 7,028 cases in receipt of compensation, of which 2,865 were fresh cases involving compensation for the first time during the year. The committee made no special inquiry into this disease as it was at the time a subject of special investigation by the Miners' Nystagmus Committee of the Medical Research Council. The committee supports the findings of the Miners' Nystagmus Committee, which recommended that everything possible should be done to make the standard of illumination of objects looked at by the miner equal to that of an open light pit, particularly by increasing the illuminating power of safety lamps, by the use of electric lamps

attached to the miner's head or belt, and by whitewashing.

Eye Accidents in Factories and Workshops

After reviewing the statistics available, the committee concludes that there is no reliable information at hand in regard to the loss of vision caused by accidents in factories and workshops as a whole.

The principal industries carried on in factories and workshops, which involve danger to the eye, were considered by the committee. "In factories and workshops the chief source of injury to the eyes lies in the metal and engineering trades, including shipbuilding. Eye accidents also occur in smaller numbers in many other industries." The committee made a special inquiry into three branches involving special risk to the eyes—namely, aerated water manufacture, textile trades, and industries involving the use of chemicals.

After reviewing the incidence of eye accidents in the metal and engineering trades, including shipbuilding, the committee considered the various processes in engineering and the special risk of eye injury attendant upon each, as well as the dangers in the special industries indicated.

Prevention of Eye Injuries in Factories and Workshops

One of the first points to which the committee draws attention is the examination of the eyesight of workers, not only of young persons entering industry, but also of those who enter industry after the age of 16. "In our opinion it would be desirable that persons over the age of 16 should also undergo a test of vision before entering employment which requires good eyesight."

The proper lighting of factories and workshops also received the attention of the committee, and reference is made to the Reports of the Departmental Committee on Lighting in Factories and Workshops, in which attention was drawn to the connection between lighting and the incidence of accidents generally. The value of guards and screens in protecting the workers from flying particles is also emphasized, and the extended use of screens wherever possible in order to give protection against flying particles is recommended.

Goggles and Masks.—In the great majority of industries where there is definite risk of eye accidents, goggles offer the best protection. The objection to the use of goggles in certain cases is considered by the committee, which recognizes that it is a matter of great difficulty to secure the wearing of goggles, although it considers "that improvements in the goggles themselves will contribute to its solution." The design and construction of goggles are considered briefly by the committee, which recommends that the Home Office take immediate steps to issue detailed specifications of the most suitable forms of goggles and masks for the respective industrial processes. Reference is made to the United States Bureau of Standards which recently issued a National Safety Code for the protection of the heads and eyes of industrial workers. In considering the measures for securing the wearing of goggles, and the possibility of compulsion, the committee states that it does not consider that any general measure of a compulsory character is to be recommended. Resource, it thinks, should be had rather to development of works and safety committees and the general persuasive methods to be brought about through educative influence.

First Aid and Ambulance in Factories.—The importance of promptitude in securing treatment in eye accidents cannot be too strongly emphasized. Out of 1,000 inpatient eye accidents of all kinds recorded at Glasgow Ophthalmic Hospital in a period of five years, and investigated by Dr. Barrow, we are informed that 300 were cases of infected corneal abrasion. An injury to the cornea, however slight, is always a potential source of danger. Emphasis is laid on the importance of early treatment of eye injuries, and importance is attached to the effective provision and organization of first aid in factories.

Eye Accidents in Mines and Quarries

Statistics.—The percentage of eye accidents to all accidents in the years 1919 to 1920 in quarries under the Mines Department is given as 5.5 and 5.3 respectively. Comment is made on the lack of precise information given as to the loss of vision, and as in the case of factories, further knowledge of the amount of injury caused is considered desirable.

Prevention of Eye Accidents in Mines and Quarries

"We are satisfied that at the present time there is no general method of preventing eye accidents in mines." Goggles and other means of protection, the committee states, would aggravate the deficiency of light and, if they saved some accidents to the eyes, would increase the risk of accidents of a more serious character.

Quarries.—The committee recommends that the Mines Department endeavor to extend the use of goggles in quarries, and for that purpose enlist the aid of the workmen's and other organizations.

First Aid.—The importance of first aid in mines and quarries regarding eye accidents is emphasized, and it is recommended "that the Mines Department should require all ambulance stations, above and below ground, to be provided with equipment for the first aid treatment of eye injuries, and should take steps to ensure that all cases of eye injuries receive adequate first aid treatment at the earliest possible moment."

EYE ACCIDENTS IN AGRICULTURE

After reviewing the cause of eye accidents among agricultural workers, the committee states that it would appear that in at least some of the occupations in which eye accidents occur, such as hedge trimming, the wearing of suitable goggles would be practicable, and would give a certain amount of protection.

The appendices to the report include tables of eye accidents in various industries, and hospital records of eye injuries, all of which are considered in detail in the report.—J. C. B.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

RECORD OF INDUSTRIAL ACCIDENTS IN THE UNITED STATES TO 1921. *L. W. Chaney. U. S. Month. Labor Rev., Dec., 1922, vol. 15, pp. 159-173.*

It is the present purpose to indicate the source from which information regarding industrial accidents may be derived and to illustrate the kind of information available. The writer presents his views of the subject through the aid of a series of sixteen tables, dealing first with casualties as recorded by the various states. The remainder of the tables give accident data for specific industries.—R. B. C.

CAUSES AND COST OF INDUSTRIAL EYE INJURIES IN THE UNITED STATES. *U. S. Month. Labor Rev., March, 1923, vol. 16, pp. 110-113.*

"The United States Bureau of Labor Statistics has received from the National Bureau of Casualty and Surety Underwriters certain statistical data relative to the causes and cost of industrial eye injuries in the United States. This information represents the accident and compensation experience of several insurance carriers for the policy year 1919 as reported to the National Council on Workmen's Compensation Insurance. It covers the entire experience of these carriers in all industries and all parts of the United States. It shows the number of injuries requiring medical aid, the number of tabulatable and compensable injuries, the total medical and compensation cost, and the average compensation cost per compensable case for each of the principal cause classifications. Unfortunately the data cover only about 10 per cent. of the total industrial eye injuries in the country; furthermore, the injuries are not classified by severity. For example, the number of loss-of-eye cases can not be ascertained nor the particular causes which produce these injuries. Nevertheless the data are deemed of sufficient value to warrant publication, despite the limited exposure, because they show fairly accurately around what causes the accidents congregate, thus pointing the way to the safety engineer for effective accident prevention work.

"The data include 32,825 injuries requiring medical aid, 7,826 tabulatable injuries, and 1,400 compensable injuries. These three categories are not mutually exclusive. Most of the medical-aid injuries do not come within the tabulatable group, whereas practically all of the tabulatable and compensable injuries require medical treatment. The compensable

injuries, however, must obviously also be tabulatable. The total cost of all the injuries amounted to $671,569, of which the medical cost constituted $186,602 and the compensation cost $484,967. The average compensation cost per compensable case was $346, and the average total cost per case requiring medical treatment was $20.

"An analysis of the data brings out some significant facts for the safety engineer. Flying particles and objects account for 70 per cent. of the total eye injuries and 50 per cent. of the total cost. Of these, abrasive wheels produce 10,210 or 31 per cent. of the total medical-aid injuries, but only about 9 per cent. of the total cost; objects flying from tools handled by the workers account for 9 per cent. of the accidents, which represent 15 per cent. of the cost; and flying particles not otherwise classified account for 30 per cent. of the accidents and 24 per cent. of the cost. From the foregoing it will be seen how important a factor goggles and other eye-protecting devices are in reducing the hazard resulting in eye injuries."

A table showing the number and cost of industrial eye injuries for the policy year 1919, classified by cause, is appended to the article.—R. B. C.

Cost Measurements of Industrial Accident. *J. L. Train. Nation's Health, Feb., 1923, vol. 5, pp. 95-96.*

In estimating the economic cost of industrial accidents, three aspects are to be considered: (1) The loss of productive labor on the part of workmen who are killed or injured, together with the cost of medical and surgical attention and the overhead cost in connection with the payment of claims. (2) The indirect loss to production due to the stoppage or slowing up of work when an accident occurs. (3) The injurious effect of frequent accidents on the morale of workers.

As a result of investigations and studies of statisticians and actuaries, it is estimated that the United States suffers annually an economic loss, due to industrial accidents, of $1,010,500,000. This figure does not take into account the indirect loss due to stoppage or to slowing up of production following accidents, the injurious effects on morale, nor the cost of training new workers to replace those injured.—K. R. D.

Accident Prevention. *D. D. Goldingham. Indust. Welfare, 1923, vol. 5.*

This, the third article of the series, describes the uses of an Emergency Committee, of an Accident Investigation Committee, and goes in a detailed way into the work of the official in charge of safety inspection and prevention of accidents.—E. M. H.

How Industrial Accidents Are Being Prevented. *A. H. Young. Nation's Health, Feb., 1923, vol. 5, pp. 97-98.*

The author's comprehensive program for safety education within the shop indicates the versatility and ingenuity of modern safety work. This program includes: "(1) Physical examination of applicants for employment. (2) Periodic re-examination of employees. (3) Proper introduction of the new employee to his job, his foreman, and fellow workers. (4) Safety committees. (5) Schools of instruction for safety committeemen. (6) Bulletin posting. (7) Interdepartment and interplant safety contests. (8) Prizes for 'no accident' periods. (9) The 'new broom,' 'crowing rooster,' 'bulls-eye,' and similar contest trophies. (10) Rule books for employees and foremen. (11) Drawings and specifications for standard equipment. (12) Lectures and movies. (13) Suggestion system. (14) Plant publication. (15) Foremen's training courses. (16) Special drive days, such as 'good ladder day,' 'chain and cable inspection day,' 'good housekeeping week,' etc. (17) Pay envelope inserts of slogans and sermonettes. (18) Safe clothing. (19) Safe practice inspections. (20) Safety museums and 'bad tool morgues.' (21) Fitting and specially grinding goggles. (22) Fire prevention. (23) Sanitation. (24) Ventilation. (25) Warning signs and lights. (26) English classes. (27) Fatigue studies."—K. R. D.

Industrial Accidents Can Be Prevented. *D. Van Schaack. Nation's Health, Jan., 1923, vol. 5, pp. 41-44.*

The author, quoting from accident frequency and severity rates filed with the National Safety Council for the year 1921, gives numerous and striking figures upon the reduction of accidents among a variety of industrial organizations which have actively furthered accident prevention. The author

urges the development of mechanical and engineering improvements and the organization and education of personnel, workmen, foremen, and superintendents as the essential measures in furthering safety work.—K. R. D.

Safety and Accident Prevention Service. *Safety Engin., Jan., 1923, vol. 45, pp. 4-5.*

This article pays tribute to the private insurance companies for their pioneer work in the prevention of accidents. The large compensation insurance companies have built up organizations of technical men, safety engineers, chemists, physicians, and field inspectors, who have labored unceasingly in demonstrating that the great bulk of industrial accidents is preventable. This has been the work of years and has now reached a stage of great efficiency. It is proposed in two bills before the New York legislature (Senate Bill No. 119, Introductory, and New York Assembly Bill No. 6, Introductory) to give an absolute monopoly of workmen's compensation to the state of New York, with some slight exceptions. The effect of this would be to cause all private insurance companies to withdraw from this particular field. Their highly-trained safety organizations which now do such good work would then cease to function. The article urges that definite provision be made for uninterrupted efficiency in accident prevention and inspection service before final action is taken on the bills.—G. N. T.

Industrial Safety. *Internat. Labour Rev., Feb.-March, 1923, vol. 7, pp. 402-417.*

This article is the first of a series of notes on accident statistics and measures adopted to promote industrial safety. Three closely interrelated factors are held to be concerned: (1) the equipment and working, (2) the employer, and (3) the worker. These factors may work in a beneficial or a vicious circle: improvement of any one of them reacts on the others. The results can be measured only by keeping records and by studying them when kept. Industrial safety has psychological and technical aspects; but the former is the more important. Abstracts from reports issued in various countries follow; they refer to Great Britain where, in addition to the introduction of several valuable new safety devices, the safety-first movement is being extended by the institution of works' committees and safety committees; to Switzerland, where the Institute for Accident Insurance is the chief authority concerned, and accident prevention, although a comparatively new study, is being actively pursued; to Austria where grave and unnecessary risks appear to be run and the inspection staff is insufficient to cope with the work; to Belgium where an effort to get back to pre-war conditions is meeting with some success although the inspectorate is but weakly supported by the courts; and to mining accidents in Germany where rescue work is carefully organized even though the results do not spell great success, while statistics suggest that there has been a marked diminution in the sense of responsibility among the workers since the war. This series of notes should prove of great interest in the future.—E. L. C.

Rules and Regulations for Safeguarding Power Press Tools. *Mass. Dept. Labor and Indust., Bull. No. 17, 1922, pp. 2.*

For the purpose of affording protection to employees who may be exposed to accident hazard in the operation of power press tools, the series of rules and regulations contained in this pamphlet has been adopted.—M. C. H.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Muscular Exercise, Lactic Acid, and the Supply and Utilisation of Oxygen. *A. V. Hill and H. Lupton. Quart. Jour. Med., 1923, vol. 16, pp. 135-171.*

The authors describe a number of observations which they have made, and incorporate with them a critical analysis of the work done by one of them (A. V. H.) and by other investigators during the last few years. They point out that, when a muscle contracts, it makes no use of oxygen during the active process. The oxygen is used only in the recovery processes, and in fact during violent muscular exercise the muscles get heavily into debt for oxygen, and may have to take up as much as 13 liters of extra oxygen, after the exercise is over, before they return to their normal resting state. It is probable that a hexose diphosphate is derived from the glyco-

gen of the muscles, and this substance undergoes explosive transformation into lactic acid when muscle contracts. During the recovery process about a sixth of this liberated lactic acid is oxidized to carbon dioxide and water, while the remainder is built up again into glycogen. It has been calculated that after violent exercise the muscles may contain over 100 gm. of lactic acid, not in the free state, but as sodium and other salts. The recovery process may take nearly an hour for its completion, though the larger part is achieved in the first minute or two after the exercise. When muscular exercise is taken at a certain rate (for example, running at 203 meters per minute) an equilibrium is reached in two minutes between the lactic acid production and the recovery processes, and the work can be continued indefinitely at the same rate. If the muscular exercise is more vigorous (for instance, running 267 meters per minute) the oxygen consumption by the body may be only slightly greater, because the mechanisms of oxidation have reached their limit, so that the muscles get more and more into debt for oxygen, until finally they have to cease work, or slow down. It follows that the maximum duration of a muscular effort of given intensity depends simply on the supply of oxygen, actual or potential. For instance, it was found that in one subject the maximum intake of oxygen, over and above the volume taken in when he was resting, was 4 liters per minute, while the maximum amount of oxygen for which he could run into debt (owing to lactic acid formation) was 10 liters. Hence in a running race lasting one minute the total oxygen available would be 10 + 4 = 14 liters, while in a two-minute race it would be 18 liters, and in a five-minute race, 30 liters. That is to say, the available oxygen supply was 14, 9, and 6 liters per minute in the three instances; it follows, therefore, that the speed at which the race could be run was less and less, in proportion to its length. In actual fact, the subject was able to run one-fourth mile in fifty-three seconds, one-half mile in 123 seconds, and 1 mile in 285 seconds.

The lactic acid liberated in the contractile process is neutralized chiefly by the protein "buffers" of the muscle, and possibly in part by phosphates, but not by the bicarbonates, if the exercise is moderate. If the exercise is violent, carbon dioxide is turned out of the bicarbonates, and the respiratory quotient of the excess metabolism (over and above the resting metabolism) may rise as high as 2.6 during the exercise, and may become negative during the subsequent recovery process.—H. M. V.

THE EFFECT OF ATMOSPHERIC COOLING POWER ON THE PULSE-RATE AND ON THE EFFICIENCY DURING MUSCULAR EXERCISE. *L. Hill and J. A. Campbell. Abstr. as follows from Jour. Physiol., 1922, vol. 56, Proc. 49, in Physiol. Abstr., Dec., 1922, vol. 7, p. 472.*

During fifteen minutes' work on a bicycle ergometer, the cooler conditions greatly relieved the heart—reduced the pulse-rate—although the gross and net efficiencies of muscular contraction were not affected.

THE INFLUENCE OF ALCOHOL ON VARIOUS MUSCULAR ACTS. *H. M. Vernon. Brit. Jour. Inebriety, 1923, vol. 20, pp. 107-117.*

The subject took 45 or 60 c.c. of alcohol, in the form of whisky, three hours after his last meal, and he carried out a number of tests for one and one-half hours before taking the alcohol, and for two hours after taking it. A spring balance was pulled every one and one-half seconds for two ten-minute periods before and after the alcohol, and it was found that the strength of pull, which averaged 210 pounds in the first two minutes and 162 pounds in the last five minutes, was only 3 per cent. less than on control days when no alcohol was taken. In an industrial operation, involving the connection of bicycle chain "combinations" by means of studs and links, the average time taken showed a 17 per cent. increase as the result of the alcohol. This effect is comparable to that observed on typewriting a memorized passage, when it was found that the time taken showed a 11 per cent. increase, while the errors made were five to six times more numerous. Evidently, therefore, alcohol has a much more harmful influence on complex and skilled muscular acts than on simple and unskilled ones.

The alcohol increased the number of errors made in an immediate memory test (columns of figures) by 31 per cent., and caused a slowing or diminished skill in a multiplication test and a synonym test of 2.3 per cent. and 6 per cent. respectively.—H. M. V.

THE INFLUENCE OF REST PAUSE AND CHANGES OF POSTURE ON THE CAPACITY FOR

MUSCULAR WORK. *H. M. Vernon. Abstr. as follows from Jour. Physiol., 1922, vol. 56, Proc. 47, in Physiol. Abstr., Dec., 1922, vol. 7, p. 472.*

By means of a dynamometer—500 pounds spring balance—the enormous value of change of posture during the rest pause in improving the strength of pull and in lessening fatigue is indicated. The posture effect is probably due in chief part to the influence of the postural changes on the circulation.

SPOILED WORK IN INDUSTRY WITH REFERENCE TO THE TIME OF DAY AND TYPE OF OPERATION. *A. H. Ryan and P. S. Florence. Jour. Nat. Inst. Indust. Psychol., Jan., 1923, vol. 1, pp. 193-197.*

The percentages of spoiled work during each hour of the working day (7 A.M. to 12 M., 1 P.M. to 6 P.M.) were determined in three different types of operation. In grinding springs a flat surface was ground on the two ends of a spring by means of an emery wheel. The spoiled work amounted to 6.2 per cent. in one group of workers, and 12.4 per cent. in another. It was highest in the last hour of the afternoon spell of work, and the average for the whole afternoon spell was 5 per cent. greater than that for the whole working spell. It was least of all in the middle of each spell, being then more than 20 per cent. below the average. In two footpress assembly operations, in which small parts were stamped together by means of a footpress, the percentage of spoiled work varied from 0.26 to 1.27. The afternoon work gave exactly the same average of rejections as the morning work, but the spoiled work was at a maximum at the beginning of each spell, and normally fell from that time onward.

The time lost in voluntary and involuntary rests by the women engaged in grinding springs was determined, and was found to average 1.2 and 4.4 minutes per hour, respectively. The voluntary rests gradually increased throughout each work spell, but the involuntary rests reached their minimum in the middle of each spell. The speed of production, during actual working time, was nearly constant throughout the working day. —H. M. V.

THE INTERPRETATION AND PLOTTING OF OUTPUT CURVES. *E. Farmer. Brit. Jour. Psychol., Jan., 1923, vol. 13, pp. 308-314.*

Output curves are held to be important to the study of industrial fatigue; instances of curves from glass blowing, metal polishing, packing, and chocolate dipping are given. These curves give some measure of genuine workaday fatigue, but differ in kind from curves of experimental fatigue due to exceptional tasks performed in laboratories. They represent activity after adaptation and motor habit have done what is possible toward off or to mitigate fatigue, and after engineers and employers have made processes as easy as possible. Hence research into output curves is an attack upon a comparatively isolated problem; nevertheless the scientific worker who effects a healthful change in an output curve may be sure that he has given relief to the operative. A healthful curve is one which represents even working from hour to hour and does not fall away as work proceeds; it may or may not exhibit an end spurt, but the presence of an end spurt is a good rather than a bad sign.—E. L. C.

PLACE OF GOVERNMENT IN FATIGUE ELIMINATION. *A. F. S. Kent. Nation's Health, Feb., 1923, vol. 5, p. 106.*

The author reviews briefly the history of fatigue investigation in Great Britain, summarizes the part the British government is taking in work relating to fatigue, and outlines the aspects of fatigue elimination with which government organizations are fitted to cope.—K. R. D.

WOMEN AND CHILDREN IN INDUSTRY

SAME STANDARD IN INDUSTRY FOR MEN AND WOMEN. *Nat. Safety News, Feb., 1923, vol. 7, p. 28.*

"That safeguarding health and interests of women in industry requires no definite federal standard was the consensus of opinion of representatives of national organizations who met in conference January 11, 12, and 13, in Washington, called by the Women's Bureau of the Department of Labor." The problem of women in industry is much the same as that of men, the delegates agreed, but women should be placed through selection.

The Washington conference, which was at-

tended by delegates from sixty-eight organizations and at which forty-two states were represented, was called primarily in order to obtain a survey of working conditions among women throughout the country, especially in regard to health measures and environment. It was reported that 8,500,000 women are gainfully occupied in the United States.

Dr. R. A. Spaeth reported that the death rate of women employed in industrial and manufacturing plants is higher than that of men, but from a health standpoint women are at no disadvantage. Women are more adept at operations requiring repetition of action but cannot take the place of men in heavier manual labor. Of 572 listed industries women are employed in all but thirty-five.—M. C. H.

CHILD LABOR IN MICHIGAN SUGAR BEET FIELDS. *Am. Child, March, 1923, vol. 5, pp. 1-4.*

From May to November 25, 1922, with the exception of the month of August, three agents of the National Child Labor Committee made an investigation of conditions in the "Thumb" and Saginaw Valley beet fields of Michigan. Their purpose was to determine whether the work done by young children was detrimental to their health, education, and fitness for citizenship. They found three classes of workers in beets: farm owners, farm renters, and contract labor families, the last a migratory class who find in the beet fields employment for their children who are under 14 years of age. State laws prohibit such employment in factories or workshops.

It was found that much of the necessary labor was arduous. In some operations children worked with hands and feet on the ground, head hanging forward, or on hands and knees, creeping over the rough ground; in others, with legs straddled, the body continually bent; in some, a heavy knife lent an element of danger. Work was conducted from dawn to dark and regardless of weather. Living conditions, especially among contract labor families, were frequently of the poorest, owing to lack of sanitation and to overcrowding. Of 1,358 children under observation, forty-six were 5 years of age; 122, 6 years; and 270, 7 years.

A system of work permitting children to be excused from attendance at school during the season for working in beets, resulted in contract workers' children losing 63.6 per cent. and owners' or tenants' children 29.5 per cent. of their total school time. "School is looked upon as an incidental luxury to be indulged in only when there is no work to be done." The attitude of parents and of sugar company representatives is one of more or less open opposition to attempts to enforce attendance. Such conditions result inevitably in retarded development among the children; this retardation was found proportional to the time lost from school. Failure of children to get a normal American education is perhaps the most serious defect of the whole system.—G. N. T.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

CLAIM COSTS REDUCED BY HEALTH SUPERVISION. *R. S. Quinby. Nation's Health, Jan., 1923, vol. 5, pp. 35-36.*

In Quinby's opinion "the methods and machinery by which a system of health supervision may be built up and conducted so that the greatest influence may be exercised in the reduction of costs in benefits, insurance or compensation, as applied to disabled workers in industry are (1) Physical examinations of applicants and periodical re-examination of those already employed. (2) Dispensary treatment of sicknesses, accidents, and in many cases care of dental, ocular, and other conditions. (3) Supervision of factory sanitation and the elimination of accident and disease hazards. (4) Absentee investigation, home nursing and medical supervision in such cases as it may seem advisable. (5) Education in health, personal hygiene, and safety. (6) Facilities for the settlement of all claims involved in any compensation or benefits for sickness, accident or death."

Following this introduction the author outlines the gradual development of the health supervision program of the Hood Rubber Company and describes the creation and operation by the Hood Company of a mutual

liability insurance company for the purpose of carrying their own liability in industrial accidents.

The average disability per employee per year in the Hood Company has been reduced from 0.85 days in 1917 to 0.32 days in 1921. The percentage of employees disabled yearly by industrial accidents has been reduced from 0.24 per cent. in 1917 to 0.10 per cent. in 1921. At the same time the cost of operation of the benefit plan (including compensation or benefits for sickness, accidents or death) was approximately one-half the cost of reinsuring the plant in a commercial company.—K. R. D.

THE NEED FOR PERIODIC MEDICAL EXAMINATIONS. *E. H. Marsh. Med. Times, Oct., 1922, vol. 50, pp. 253-255, 275.*

Although there has been a marked decrease in the general mortality rate over a long period of years, this has been due largely to the lowering of mortality among infants and in certain specific communicable diseases. The degenerative diseases of adult life, such as cancer, diabetes, and organic disease of the heart, present the chief problem for preventive medicine and public health work in the future. The Metropolitan Life Insurance Company, the Life Extension Institute, and the Committee on Elimination of Waste in Industry of the Federated American Engineering Societies have all attacked this problem and from a study of their data the writer draws the following conclusions: (1) It is evident that the mortality in the so-called degenerative diseases is steadily increasing. (2) Health surveys show that almost one-third of those sick and disabled are so because of these diseases. (3) Health surveys show that 28 per cent. of those sick and disabled have been in such condition for one year or more. (4) From 10 to 12 per cent. of individuals with physical impairment necessitating medical advice are not aware of their condition. (5) The economic loss from morbidity and mortality in these diseases is enormous. (6) By periodic medical examination with appropriate advice and treatment the mortality from the degenerative diseases can be postponed.—G. N. T.

NEW ENGLAND CONFERENCE. *Nation's Health, Jan., 1923, vol. 5, p. 45.*

This brief article consists of an outline of the method, developed by the New England Conference of Industrial Physicians, for making routine physical examinations of applicants for employment.—K. R. D.

CONFERENCE BOARD OF PHYSICIANS IN INDUSTRY. *Nation's Health, Jan., 1923, vol. 5, pp. 44-45.*

This brief report includes a revised outline of standard physical examination as developed by the Conference Board of Physicians in Industry.—K. R. D.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

INDUSTRIAL DISEASES AND FORENSIC MEDICINE. *John Glaister. Brit. Med. Jour., 1922, vol. 2, pp. 165-170.*

A short discussion of the need of more thorough knowledge in forensic medicine, both for physicians and general legal practitioners, is followed by a more detailed consideration of the history and present status of compensation for workmen in the British Isles.

In 1880 Parliament passed the Employer's Liability Act which modified the former common law rules for the workers' benefit. It was still necessary, however, for the workman to prove that accidents were due to negligence on the part of the employer or his subordinates. It was not until 1897 that the first Workmen's Compensation Law was passed. This provided for compensation independent of the question of negligence. It was followed in 1900 by a second act, including agricultural employees. Industrial diseases as distinguished from accidents first appeared in the Act of 1906 which also improved procedure in handling cases. At this time the United States had enacted no legislation for compensation to workmen.

In the Compensation Act of 1906, only six industrial diseases were scheduled as coming within the Act. Authority for enlarging this list was given, however, and today there are about thirty diseases specified. Fibroid phthisis or silicosis is dealt with under a special act passed in 1918. Schemes have been developed for the refractory industries in-

volving the formation of Mutual Associations of Employers to take over responsibilities of employers, to pool finances, and to dispense compensation under the supervision of joint committees of employers and workmen supplemented by a medical advisory committee.

Figures are given showing that in 1920 the number of fatal cases from industrial diseases was twenty-seven and the number of disablements 10,425, involving payments of £5,387 and £365,684 respectively. The mining industry contributed the bulk of the disablement cases, 90 per cent. being due chiefly to nystagmus, beat hand, and beat knee.

The operation of the Act of 1906 has been under the scrutiny of a committee which has submitted recommendations designed to correct errors of procedure, to provide for the handling of appeals, and to protect the ignorant workman in his rights. This committee has reported adversely on establishing a state system of insurance but has recommended that insurance with companies or through mutual associations be required, the only exception being concerns whose payrolls average more than £20,000 over a period of three years. Rehabilitation of injured workmen and the restoration of their earning capacity is, in the opinion of the committee, a work to be undertaken under the National Health Insurance Acts.

Six tables of statistics show in detail the number and causes of deaths and disablements, the compensation paid, and other valuable data.—G. N. T.

Fear Is Cause of Disability. *Indust. Bull. Oct., 1922, vol. 2, p. 5.*

A worker in a hat factory at Newburgh filed a claim for compensation under the Workmen's Compensation Act, stating that he suffered from mercurial poisoning. For twenty-five years he had been employed at the same plant, his work being to remove fur from hot water, and to squeeze and iron it. This fur had been treated with mercury.

A specialist in nervous disorders who made an examination and reported, to the referee, found that the man had none of the mouth, gastro-intestinal, or other signs of mercurial poisoning. In his opinion the man was honest but had become so fearful of poisoning through seeing fellow workmen stricken with it that he had brought upon himself certain symptoms which he had observed in others, such as tremor and wry neck. It was found that his neck straightened out when his mind was occupied with other things, and that the tremor was a functional emotional rather than an organic one.

The referee disallowed the case as not the result of an occupational disease within the meaning of the law.—G. N. T.

Decisions of Courts and Opinions Affecting Labor 1921. *L. D. Clark and D. F. Callahan. U. S. Bur. Labor Statis., Bull. No. 309, Sept., 1922.*

The bulletin is the ninth of a series devoted exclusively to the presentation of the decisions of courts and the opinions of the Attorney General of the United States bearing on various phases of labor.—M. C. H.

The Workmen's Compensation Bill. *A. G. Clow. Jour. Indian Indust. and Labour, Nov., 1922, vol. 11, pp. 473-488.*

A bill to provide for workmen's compensation was introduced in the Indian Legislative Assembly in September, 1922, and is expected to become operative in July, 1924. Its provisions, based on experience from other countries, are aimed at (1) increasing output by reducing waste of labor due to disablement; (2) increasing efficiency by creating a greater sense of security; and (3) increasing the supply of industrial labor (an important matter in agricultural India) by providing benefit in case of accident, an ever present fear to natives. Today an employer is liable for his own negligence but not for his manager's. The new ordinance is to be confined to organized industries, such as factories using mechanical power and employing not less than twenty persons, mining, railways and trams, dock labor, building, telegraph and telephone service, underground sewerage work and fire brigade service. Compensation is to be payable when personal injury is caused arising out of, and in the course of, employment; the principle is that the injury must result from a hazard of *employment* and not merely of *existence*. Drunkenness, disobedience, and removal of safety devices, are to invalidate claims. In case of death compensation is thirty months' wages; and in the case of complete incapacity, forty-two months'

wages for adults and eighty-four months for minors. The extent of disablement is fixed by schedule—that is, the loss of a leg below the knee is fixed at 50 per cent. disability, and loss of an index finger at 10 per cent. All these payments take the form of lump sums.

The case of temporary injuries is different: adults are to receive half wages and minors two-thirds. The first ten days do not count; but payments can go on for seven years. Either party may convert for a lump sum at the end of six months, or conversion, if both parties agree, may take place earlier.

State insurance is not attempted; nor is an employer compelled to insure his risk. If an insured employer goes bankrupt, the insurance company remains liable. Diseases can be added by schedule; and power is taken to enlarge the scope of the bill without recourse to new legislation, such as the inclusion of a hazardous occupation. This ordinance marks an important step in the industrial development of India.—E. L. C.

REHABILITATION OF DISABLED EMPLOYEES

National Program of Vocational Rehabilitation. *J. A. Kratz. Nation's Health, Dec., 1922, vol. 4, pp. 741-744.*

In order to receive the benefits of the Federal Act for the vocational rehabilitation of persons disabled in industry, the state must accept its provisions by an act of the legislature. The State Board for Vocational Education thus co-operates with the Federal Board for Vocational Education, the latter recognizing certain specific services for which sums will be advanced.

There are, on the other hand, certain services not provided for by the Federal Act which must consequently be performed by such co-operating agencies as state medical associations, hospitals, associated charities, labor organizations, etc. To meet this situation a number of states have developed a system of organized co-operation. These co-operating committees have for the most part rendered conscientious and effective service, thus reflecting the feeling of pride and responsibility which the community takes in this kind of work.

The work is new, and consequently for the next few years new methods of procedure and administration will be discovered and tried out.—L. A. S.

Team Work for Disabled Employee. *M. Boyd. Hosp. Management, Jan., 1923, vol. 15, p. 70.*

The author cites numerous cases in which an industrial nurse can be of real help to workmen and their families if she is equipped with a thorough knowledge of co-operative welfare agencies. A word of advice from the well-informed nurse as to the use of dispensaries, children's homes, and infants' welfare stations is often the means of relieving serious troubles. Such timely direction prevents a great deal of suffering and brings its reward in wider influence for good.—G. N. T.

Industrial Rehabilitation of Handicaps in Wisconsin. *G. P. Hambrecht. Abstr. from Wis. Apprentice, Madison, Wis., Sept., 1922, in U. S. Month. Labor Rev., Oct., 1922, vol. 15, pp. 822-823.*

When handicapped individuals in Wisconsin are unable to support themselves while being retrained, the problem of rehabilitation is solved in the following way:

1. If the case is an industrial accident coming under the provisions of the workmen's compensation law, it is provided by law that the injured may apply for extra compensation to the amount of $10 a week for a period not exceeding twenty weeks.

2. If the handicap was injured in an accident other than an industrial one, maintenance is secured through interested persons, societies, fraternal organizations, etc., if that is possible.

3. When no other plan is feasible the state will maintain the handicap, the law stipulating that such payments shall not exceed $20 per week and the period for which it is paid shall not exceed twenty weeks, unless an extension of time is granted by unanimous vote of the state board of vocational education.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

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GENERAL

THE INDUSTRIAL DOCTOR

The Industrial Doctor, the official organ of the New York Association of Industrial Physicians, is a monthly publication, the first issue of which appeared in January. There are included original articles, largely contributed by physicians of the state, abstracts from important government publications, and miscellaneous notes.—W. W.

THE POSITION OF THE STATE INDUSTRIAL PHYSICIAN AND THE SCOPE OF HIS ACTIVITIES.

Gerbis. Abstr. from Med. Gesellsch. z. Magdeburg, Official Protocol, Nov. 30, 1922, in München. med. Wchnschr., Feb. 9, 1923, vol. 70, p. 192.

The article gives a summary of the aims and duties of the state industrial physician, and points out the necessity for greater co-operation between him and the practising physicians.

Gerbis points out that the state industrial physician does not wish to exceed his authority nor to sow seeds of distrust by trying to get control, but rather he aims to be an adviser and guide in industrial hygiene work. The author describes the wretched conditions in the home industry of the Thuringian glass blowers, the diseases arising from work in heat and cold, the effects of exposure to sulphurous fumes, the tremor caused by working with mercury, and the asthma of fur dyers. Special attention is given to nitrobenzol which is harmless in winter but which has fatal effects in the summer, especially when a person indulges excessively in alcohol at the same time.

Gerbis urges more active co-operation on the part of practising physicians.—A. S. M.

THE RAILROAD SURGEON: PRESENT, PAST, AND FUTURE. *L. E. Burch. Southern Med. Jour., Jan., 1923, vol. 16, pp. 33-35.*

While the medical department of railroads has always been important on account of the occupational hazard of railroad employees, still railroad surgeons of the past have not received due credit for their work by railroad operators. A new era is now dawning, however, in which railroad executives are desirous of obtaining and carrying out the suggestions of the surgeons.

The success of the surgical and medical departments of railroads depends upon the work of local surgeons. "They should, therefore, be selected according to their professional attainments and their standing for integrity and sobriety in their communities. A local surgeon should be loyal to the road he represents. He should take a keen interest in its welfare and he should keep a close supervision over the station, shops, toilets, restaurants and houses of the employees and see that they are kept in a sanitary condition. He should know thoroughly the manual of first aid and should instruct those under his supervision in its employment. He should be looked upon in his community as the representative of the road and in all of his dealings he should attempt to bring about a fair understanding between the road, its employes and the public at large. . . . A railroad surgeon, either local, division or chief, should not be expected to take any part in the settlement of claims nor should he be expected to act as a witness in those cases in which he knows the road is at fault."—M. C. H.

INDUSTRIAL DISEASES. *Belgium Letter. Jour. Am. Med. Assn., April 21, 1923, vol. 80, p. 1162.*

The medical service of the department of industry and labor has been making, for some time, a special study of the subject of industrial diseases, but the problem is of so vast a scope that, in order to reach a proper solution of the question, all the data that can be collected in the different factories must be brought together. It is with this in view that Dr. de Laet has lately presented to the Société de médecine légale a well-documented report on this problem of pressing interest, which affects the whole economic and industrial life of the nation. He lays stress on certain factors that must be considered in Belgium in connection with industrial diseases. After discussing succinctly the tenor of the British Workmen's Compensation Act, according to which, since 1906, compensation for industrial diseases has been regulated, and outlining the principal features of the French law of 1919, the general purport of which is the same, he pointed out that the basis of these laws is the establishment of the list of presumptions of origin. On the more or less complete condition of these lists depends the degree of efficacy of these laws. One cannot understand the pathology of industrial diseases without studying it from the ground up, with all the necessary helps, and unless one examines thoroughly into all new, suspected and light cases. In order that these conditions may be realized, three things are needed: (1) The creation, in the sense of strict specialization, of a school of "factory medicine," in which special training can be given by our medical colleges as an accessory to the course in legal medicine, as has been frequently proposed; (2) the establishment of a number of clinics to which sick and injured workmen may be admitted and which are equipped with all the means of exploration necessary. These clinics would study, at the same time, the therapeutics especially applicable to the pathology of industry; and (3) legislation creating these organizations, regulating their function and management, and establishing, along with the list of presumptions of origin, the mode of determining compensations for sufferers from industrial diseases.—M. C. H.

FACTS REGARDING INDUSTRIAL HYGIENE THE PUBLIC SHOULD KNOW. *F. J. Monaghan. New York City Dept. Health, Month. Bull., Dec., 1922, vol. 12, pp. 273-277.*

This is a general article touching upon the various phases of industrial hygiene.—M. C. H.

PROCEEDINGS OF THE SIXTH ANNUAL INDUSTRIAL CONFERENCE OF THE STATE OF NEW YORK, NOVEMBER, 1922. *Albany, 1923, pp. 188.*

At the Sixth Annual Industrial Conference of the State of New York the general theme was "Elimination of Waste in Industry." This pamphlet outlines the proceedings of the conference.—M. C. H.

HYGIENIC REGULATIONS APPLICABLE TO THE FUR CUTTING INDUSTRY. *L. Bargeron. Ann. d'hyg., Feb., 1923, N. S. vol. 1, pp. 65-72.*

The author gives an account of the fur cutting industry in France with special reference to the manufacture of felt goods, and discusses improvements in the general hygienic conditions of the industry. These could be best effected by the substitution of other compounds for the acid nitrate of mercury now generally used in the industry. It is suggested that the matter be brought to the attention of the International Labour Bureau with a view to obtaining some sort of international standardization.—P. D.

PROBLEMS AND METHODS OF VOCATIONAL GUIDANCE. *E. Claparède. Internat. Labour Office, Studies and Reports, Series J, No. 1, Oct., 1922, pp. 1-77.*

From earliest times, attempts have been made to adapt work to the worker, but usually in a crude way. The present movement for vocational guidance came from various sources. The study of accidents and the means of preventing them brought out the need for qualifying tests for certain occupations, like that of locomotive engineer. Labor turnover, due to dissatisfaction or unsuitability of the worker for his job, was seen to be a serious matter. Investigations conducted by those interested in efficiency or from philanthropic motives added to the weight of evidence in favor of vocational guidance. Experimental psychologists became interested in the movement, devising mental tests and various methods of measuring abilities. The war gave an added stimulus to such work, as it was essential to determine with some measure of accuracy those who would make good aviators, officers, and specialists in various lines of work. The vocational guidance movement is recognized today as having the strongest possible motive for existence—the object of putting the right man in the right place.

The problem takes on two forms, that of the choice of an occupation for an individual (vocational guidance), and that of the choice of an individual for a given occupation (vocational selection). A great deal of work has been done in the way of applying occupational and psychological tests, many of which are considered in this article. It is concluded that if vocational guidance is to achieve satisfactory results, the following principles must be observed:

"1. Psychological analysis of occupations and their classification according to the abilities required.

"2. Determination of corresponding abilities in individuals and, as a preliminary, the testing of tests to decide their diagnostic, and even more their prognostic, value.

"3. Investigation of the process of training and educability.

"4. Determination of the importance of general intelligence in the various occupations.

"5. It should never be forgotten that a forecast of ability will never be a certainty, but only a probability. Statistics should be prepared to determine this probability.

"6. Efforts should be made to arrive at a uniform system of measurement so that psychographs of psychological diagrams may be comparable between different countries and between different vocational guidance offices. Grading by percentiles appears to be the most rational and least ambiguous method.

"7. It is in the social interests of the community that every man should be in the position for which he is best fitted. It is also desirable and increasingly in accordance with the spirit of modern democracy that the various social functions should be allotted according to merit and not in virtue of any privilege. The only means of attaining this ideal is by a sound system of vocational guidance. All those who have at heart the harmonious organization of society, both employers' and workers' organizations, should therefore facilitate by all means in their power any investigation having for its object the establishment of industrial psychology upon a firmer foundation."—G. N. T.

AFFECTIVE FACTORS IN VOCATIONAL MALADJUSTMENT. *L. Pruette and D. Fryer. Ment. Hyg., Jan., 1923, vol. 7, pp. 102-118.*

The authors have had experience in vocational examining at a large Y. M. C. A. center. They believe that the affective condition of an individual is important in determining or preventing his adjustment to his occupational life. The vocational problem of the

counselor is to keep the individual at his normal emotional level. Men are usually depressed when they come for advice. Cases are cited of men with genuine "inferiority complex," and also cases of excessive individualism with rebellion against authority, in which vocational adjustment is difficult. The cause may be an unfortunate home situation, or too great pressure to make money on account of a mother, wife, or sweetheart. In some cases where men had been in an occupation which might be considered unethical, they were found to be blaming their lack of success on the supposition that they had sinned. All these persons might have remained contented in their occupations if it had not been for the emotional disturbance frequently arising from outside causes.

There was no apparent correlation between these affective disturbances and the ability to do mental work. Inefficiency was explainable on the basis of loss of interest, self-distrust, lowered enthusiasm and lowered vitality. A more refined technic might isolate the effect of emotional factors upon capacity for mental work.—S. C.

SOCIAL WORK, AN OUTLINE OF ITS PROFESSIONAL ASPECTS. *Am. Assn. Soc. Workers, 1923, pp. 31.*

By describing briefly, yet comprehensively, the various lines of activity open to the social worker and telling the sort of training necessary for work along each of these lines, this book fills a very decided need in its particular field.

It contains information regarding occupational therapy, psychiatric social work, social group work, community organization, institutional work, psychological work, personnel work in industry, work with racial groups, public health nursing, and nutrition work.

The price of the book is twenty-five cents, and copies may be obtained from the American Association of Social Workers, 130 East Twenty-Second Street, New York.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

SOME CLINICAL ASPECTS OF INDUSTRIAL POISONING. *N. C. Sharpe. Pub. Health Jour., March, 1923, vol. 14, pp. 110-118; April, pp. 172-174.*

This is an account of an investigation made by the Division of Industrial Hygiene, of the Provincial Board of Health of Ontario, into some health hazards from substances of a chemical character among workers in the Toronto district. The main object of this survey was to investigate the chief lead industries and this necessitated at once the investigation of hazards from volatile substances. Other industrial poisonings met with in the course of the investigation were briefly noted.

Lead Poisoning in Storage Battery Workers.—There are in Toronto three main plants. Fifty-five men were examined. Analysis of the air showed that only near the saws and the buffing or polishing machines was lead present in dangerous amounts (*i.e.*, over 5 mg. of lead per 10 cubic meters). Despite this 3 cases of lead absorption and 2 cases of past history suggestive of lead poisoning were found in workers who were assembling plates. Colic, constipation, and blue line on the gums, were the chief symptoms. Since the examination one case of acute lead poisoning has developed.

Hazards among House Painters and Decorators.—Lead, turpentine, benzine, benzol, denatured alcohol, and amyl preparations are the hazards of this industry.

In 132 painters examined no case of acute or chronic plumbism was found; 13 cases had past history suggestive of lead poisoning and 10 had complaints and physical findings due to one or another of the substances concerned. There were 40 cases with history of acute intoxication from turpentine or benzine in flat paint, 3 cases of acute intoxication in shellacking, 5 cases of poisoning from wood alcohol, 5 cases of benzine or "naphtha jags," and 4 cases of poisoning from benzol or acetone in paint removers. The following were the physical defects in the 132 painters examined:

Constipation, 26.
Pyorrhea, 41.
Poor teeth, 41.
Indigestion, 7.
Inflamed throat, 8.
Bronchitis, 7.
Myocardial weakness, 2.

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Irregular heart, 4.
Increased blood pressure, 13.
Hardened arteries, 9.
Hemoglobin (by Tallqvist scale), few over 95 per cent.; 3 of 85 per cent. and less.
Pallor of face, 19.
Albumin in urine, 1.
Headache, 21.
Tremor, 10.
Myalgia and joint pains, 24.
Loss of weight, 2.

Lead Poisoning in Rubber Workers.—One factory employing 1,200 workers had 25 men handling lead salts. In one year there were 4 cases of lead poisoning in the compounding rooms and 7 in the mixing mills, in both of which places dust was an important factor.

Lead Poisoning from Spraying Lead Arsenate Mixtures.—Symptoms pointing to mild lead poisoning were found in some men employed in spraying lead arsenate mixtures on trees for the Tussoc moth.

Effect of Volatile Substances on Furniture Finishers.—One hundred and ninety-five furniture finishers were examined. The effects were far less than in painters, 70 per cent. having no complaints and showing no effects. The physical effects noted were as follows:

Constipation, 12.
Indigestion, 12.
Pyorrhea, 11.
Bad teeth, 10.
Inflamed throat, 10.
Bronchitis, 3.
Increased blood pressure, 5.
Hardened arteries, 8.
Hemoglobin (by Tallqvist scale), only 2 less than 90 per cent.
Pallor of face, 15.
Day polyuria, 2.
Night polyuria, 4.
Headaches, 14.
Dizziness, 10.
Myalgia and joint pains, 8.
Loss of weight, 6.

Among the 195 furniture finishers were 40 men who used the spraying machine; their complaints and physical defects were found to be milder than for finishers in general.

Benzol Poisoning. — There was one fatal case in Toronto last year during the painting of a tank.

Amyl Acetate Poisoning.—One case was observed in a museum curator who had been using amyl acetate as a solvent for celluloid in the mounting of fish fins. His symptoms were pharyngitis and bronchitis, but without headache, nausea, fullness in head, or eye trouble.

Manganese Poisoning in Storage Battery Workers.—No clear case of poisoning was found though one man had the early symptoms of languor, sleepiness, and occasionally laughter without cause.

Occupational Dermatitis.—This was very frequently found. Cases were seen due to fixing solutions in woolen dyes, to chromic acid staining and turpentine in varnish rubbing of furniture, to metol in photography, to chrome ulceration in blue printing, to ursol dye in the fur industry, and to the use of denatured alcohol.

Diagnosis of Industrial Poisoning.—On the subject of diagnosis, Dr. Sharpe points out that many more cases of lead poisoning would have been recorded had the standards of diagnosis frequently reported in the literature been adopted. In the investigation of the Division of Industrial Hygiene a diagnosis of lead poisoning was not made in cases where the workers were exposed to various other substances capable of producing similar signs and symptoms. Dr. Sharpe draws a distinction between diagnosis for prophylactic reasons, where it is well to err on the safe side and to remove workers from exposure on slight symptoms, and diagnosis for clinical record or compensation, where other issues are involved. He considers it "folly to attribute all the ill health of lead workers to lead" and emphasizes the harm done to the relations between employers and medical men if a diagnosis of a certain type of poisoning is made in cases where the individual concerned was not exposed to the poison despite the fact that it is commonly used in his trade.

On the general question of diagnosis of industrial poisoning from chemicals Dr. Sharpe calls attention to the fact that early subjective symptoms are the same for many chemicals and there is no known early diagnostic test. It is, therefore, most important that the physician should acquire an intimate knowledge of the patient's occupation and its risks.—R. M. H.

FATAL PNEUMONIA CAUSED BY THE INHALATION OF CARBON MONOXIDE FROM A KILN. *L. Lewin. Abstr. from Arzt. Sachverst.-Zeit., 1922, vol. 28, pp. 105-108, in Zentrlbl. f. d. ges. Hyg., March 25, 1923, vol. 3, p. 294.*

A workman was occupied in an iron foundry for three days cutting an opening for a window in a wall at a height of 7 meters. At

the end of this time he complained of pain in the chest, and he died five days later from pneumonia. He had suffered for some time previous with chronic bronchitis.

The author believed that death was due to the inhalation of carbon monoxide which was given off from a kiln in the foundry, since in his experience this poison produces symptoms similar to those described.—A. S. M.

Poisoning by Carbon Monoxide. *R. Jaksch-Wartenhorst. Abstr. as follows from Med. Klin., Jan. 7, 1923, vol. 19, p. 11, in Jour. Am. Med. Assn., March 31, 1923, vol. 80, p. 968.*

Jaksch-Wartenhorst describes three cases of poisoning by carbon monoxide. All three had very marked cerebral symptoms (spasms, psychic disturbances, Cheyne-Stokes breathing) and one a cerebral hemorrhage two days after the poisoning.—M. C. H.

Intoxications from Benzene and its Homologues. *Durvoir. Abstr. from Bull. et mém. Soc. méd. d. hôp. de Par., 1922, vol. 38, pp. 1541-1543, in Zentrlbl. f. d. ges. Hyg., March 25, 1923, vol. 3, p. 294.*

Great confusion exists regarding the toxicology of benzol (benzene) and benzine. Frequently petroleum derivatives are confused with benzol (C_6H_6) and likewise the chlorine derivatives of methane and ethane with chlorine substitution products derived from benzol. Greater clearness is desirable especially in the development of laws for the control of industrial hazards due to these materials and in order to prove which substances are poisonous.—A. S. M.

Benzol Poisoning. *J. F. Hogan and J. H. Shrader. Am. Jour. Pub. Health, April, 1923, vol. 13, pp. 279-282.*

This paper gives the history, physical examination, and blood finding of three cases of benzol poisoning in women, two of them fatal, occurring in Baltimore in the last few months. All three were workers in the same can manufacturing plant. The poisoning was contracted from inhalation of benzol fumes from a rubber cement used in making can bottoms water tight. Of the 300 men and women employed, fifty-eight work in the room where this cement is used. The three cases showed marked anemia, low red and white cell counts, reduced hemoglobin, and vaginal hemorrhages.

The ventilation of the factory was found too lamentably insufficient to remove the volume of benzol-laden air from the evaporating boxes in which the can tops are placed after a moat around their edges has been filled with the liquid cement. The authors emphasize the importance of a complete blood examination including total white and red blood cell counts and hemoglobin estimation in all suspicious cases, if there has been exposure to benzol fumes.

Marked diminution in red cells, a profound leukopenia, and a pronounced reduction of hemoglobin of an employee calls for an immediate investigation of hygienic conditions in the factory.—H. F. S.

Occupational Benzol Poisoning. *G. Meda. Il Lavoro, Sept., 1922, vol. 13, pp. 264-270; Oct., pp. 297-300; Nov., pp. 326-334; Dec., pp. 363-371.*

Induced by the occurrence of some fatal cases of benzol poisoning in a raincoat factory in Milan the author has undertaken to summarize the subject to date. He discusses the mode of absorption of the poison, the symptomatology and the pathology of the disease, and presents with blood counts the reports of three cured cases from the industrial clinic at Milan. The symptoms and treatment of one serious case are detailed. Among other things the author notes the presence of polymorphonuclear cells in the urine from an infected kidney, in spite of a low blood neutrophilia, and gives successive accounts of the blood picture.

He further discusses the etiology, predisposition, and the question of impurities in the benzol which, he feels (except in the case of the nitro compounds), tend rather to lessen the danger of poisoning. There is in his opinion some danger from skin absorption. He concludes by recommending preemployment medical examinations to exclude persons with constitutional weaknesses, and the subsequent periodic supervision with blood examinations.

The article is a clear summary of the existing knowledge of the subject; the author has added little new. The case history with recovery from a serious condition is interesting—the treatment by intensive medication

differing markedly from the American treatment by repeated blood transfusions.—J. W. S. B.

COMPARATIVE INVESTIGATIONS OF THE TOXICITY OF SOME SAMPLES OF BENZENE AND PARTICULARLY OF SOLUTIONS OF RUBBER IN BENZENE FOR USE ON FABRICS. *A. Pugliese. Abstr. as follows from Rend. ist. Lombardo, 1922, vol. 55, pp. 404-408, in Chem. Abstr., April 20, 1923, vol. 17, pp. 1516-1517.*

The toxicity of pure and impure C_6H_6 and of rubber-C_6H_6 solutions was studied by means of animals. Three procedures were used: (1) inhalation with masks; (2) respiration of C_6H_6 vapor in closed chambers; and (3) respiration of vapor diluted with air by open windows. Dogs were used in (1) and dogs, rabbits, guinea-pigs, white mice and pigeons in (2) and (3). Chemically pure C_6H_6 had the most rapid and intense toxic action. The toxic effect of impure C_6H_6 used in the rubber industry was relatively low. A sample of C_6H_6 having the most obnoxious odor was the least toxic. After one month this became intense yellow with a precipitate and the toxicity increased. Rubber solutions were spread on cloth and the animals exposed to the vapor under the same conditions as before. By this procedure the toxic effect was not acute insofar as respiration was normal, but the body temperature decreased, with a maximum decrease for pure C_6H_6 solutions of rubber. In contrast to the other animals, the pigeons showed no decrease in temperature, but additional prolonged treatment with C_6H_6 caused a decrease, with various symptoms of chronic poisoning. Some animals developed, by repeated action of C_6H_6, a hypersensitivity and were poisoned by amounts which originally were easily tolerated. This conforms to the frequent belated symptoms of poisoning in rubber workers exposed to C_6H_6. Greatly increased thirst was a prominent symptom in all animals, particularly in rabbits and guinea-pigs. A considerable decrease in white corpuscles occurred, but the number became normal some time after removal from C_6H_6. With dilution by fresh air, the animals were not poisoned even by much higher concentrations than the maximum possible without aeration. By allowing a minimum space for each operator and with sufficient ventilation, C_6H_6 poisoning in factories should be easily avoided. Conditions at the Pirelli works are deemed satisfactory, where each worker has 56.5 m.^{3}, with replacement of 60 m.^{3} of air per minute. C_6H_6 should not be touched by hand for absorption is considerable. It is recommended that periodical examination of the blood for its leukocyte count be made to detect incipient cases of poisoning.—P. D.

EXPERIMENTAL INVESTIGATIONS OF THE TOXIC ACTION OF BENZINE, PETROLEUM ETHER AND TOLUENE. *A. Pugliese. Abstr. as follows from Rend. ist. Lombardo, 1922, vol. 55, pp. 443-444, in Chem. Abstr., April 20, 1923, vol. 17, p. 1517.*

Experiments similar to those with C_6H_6 (see preceding abstract) are reported for benzine of d. 0.74 (A) (Rumanian) and 0.71 (B), for petroleum ether (C) and for commercial PhMe (D) and pure PhMe (E). D, E, A, B and C were definitely toxic, increasing in the order given, but all less than C_6H_6. Aeration experiments were, therefore, not attempted because high concentrations of C_6H_6 were necessary to obtain definite poisoning under such conditions. Acute intoxication, ending in convulsions, was observed with C and B. As with C_6H_6, repeated treatment with A and B caused a hypersensitivity. Though D and E were less toxic than A and B, their vapors irritated to a much greater degree the mucous membranes and conjunctiva, causing lachrymation, sneezing, and coughing. The substitution of C_6H_6 in rubber factories by A or B is imprudent, for though less toxic than C_6H_6, A and B give rise to slow cumulative poisoning. To prevent industrial poisoning, precautions similar to those for C_6H_6 must be taken.—P. D.

INTOXICATIONS RESULTING FROM THE MANUFACTURE OF ARTIFICIAL PEARLS. *Paris Letter. Jour. Am. Med. Assn., March 10, 1923, vol. 80, pp. 709-710.*

Dr. André Léri reports observing in two women, engaged in the manufacture of artificial pearls, a peculiar form of polyneuritis, characterized by a paralysis affecting chiefly the interosseal muscles of the feet and hands, and, to a lesser degree, the extensor muscles of the feet and the flexor muscles of

the hands; an anesthesia in the region of the interosseal branches of the extremities; abolition of all the tendon reflexes; paralysis of the soft palate, associated with suppression of the pharyngeal reflex, and paralysis of the orbicularis oculi and the orbicularis oris. These two women filtered the nacreous varnish by hand, and also dipped the "pearls" in this varnish, which contained a high percentage of tetrachlorethane, a very volatile and toxic chlorine compound of carbon. Affections of the peripheral nervous system were found; dilation of the pupils or unequal size of the pupils with a weakened light reflex, paralysis of the extensors of the fingers, paralysis of the soft palate, with diminution or disappearance of the pharyngeal reflex, and frequently abolition of the tendon reflexes. Some of these women merely breathed an atmosphere charged with the vapors of tetrachlorethane, without coming in direct contact with this substance. It was evident that intoxication occurred by way of the respiratory passages.

Léri is convinced of the great frequency of intoxications through the industrial use of tetrachlorethane, used, not only in the manufacture of artificial pearls, but also as a solvent in a number of industries. Strict hygienic measures should therefore be employed in factories in which tetrachlorethane is used, and particularly in the artificial pearl industry. Braying of the nacreous varnish should not be done by hand, but a mechanical process should be substituted. Dipping vats containing the nacreous varnish should be kept closed as much as possible, and toxic vapors as they rise should be sucked away from below. Only the employees absolutely needed should be allowed to remain, for any length of time, in the contaminated atmosphere. The employees should receive a medical examination, from time to time, and those showing the first signs of intoxication should be eliminated without delay; the abolition of reflexes may be regarded as an alarm signal. In this manner, grave intoxication, for instance, certain types of commonly fatal icterus such as have been observed, can doubtless be prevented.—M. C. H.

The White Lead Controversy.

The occurrence of lead poisoning among painters has led to prolonged controversy as to how the workmen can best be protected, and as to the necessity for using lead in paints. The pigment most commonly employed is white lead (carbonate of lead). The question was first raised about one hundred years ago in France where it continued to receive attention from time to time until, in 1909, a law (which would have come into force in 1914 had not the war intervened) was passed prohibiting the use of lead in paints. Meanwhile other European countries, such as Belgium, Germany, Austria, and Switzerland, had taken more or less stringent action to protect the workers by regulating the painting industry. In Great Britain, where the number of deaths among painters from lead poisoning was observed to equal the total occurring in all factory industries (291 deaths to 280 in the period 1910 to 1921), the question had not been lost sight of; legislation had, however, been aiming more particularly at preventing lead poisoning in factory industries. One result of the intensive campaign so carried out had been to demonstrate that lead poisoning is caused industrially by the inhalation of lead dust, and that other paths of entry for the poison into the body are practically negligible. By concentrating on abolition of the dust risk, the cases of notified poisoning were reduced from 1,058 in 1900 to 230 in 1921, even though during these years the disease was placed on the compensation list in 1907 (a proceeding which tended to bring cases to light), and although the number exposed to risk had increased.

Two committees, however, were appointed in 1911 to report upon the use of lead compounds in the painting of coaches and of buildings. Both committees recommended the prohibition of lead paints. The Building Committee held that lead paints could readily be dispensed with for interior painting; while for exterior painting, although lead paints for all purposes could not be replaced by other equally satisfactory paints, they saw no practical means of insuring the enforcement of any code of protective measures and so advised prohibition. At the same time they expressed the opinion that demand would soon bring into existence satisfactory substitutes. The war prevented adoption of their recommendations.

The next step taken was the adoption at the

Third International Labour Conference, Geneva, in 1921, of a convention prohibiting the use of lead compounds in the interior painting of buildings, and establishing protective regulations wherever the use of such compounds was not prohibited.

Just before the Labour Conference met, a further Committee on Industrial Paints was appointed to advise the British Government as to the position as it then existed. The report of this committee has now been published.[1] It contains a recommendation that legislation should be passed to give effect to the principles embodied in the Convention adopted at the Geneva Conference; but goes no further. The committee differs from its predecessors in not recommending prohibition for the exterior painting of buildings, or for painting coaches and carriages. It based its opinion mainly upon the recent introduction of waterproof sandpaper by the use of which dry rubbing down of painted surfaces can be abolished, and with it the danger from the dust risk. It maintains that if dry rubbing down is abolished, lead paints can be used with but little risk on the external surfaces of buildings. It also optimistically expresses the hope that the trade may institute inspection within itself of itself in order to prevent breach of regulations, even though adequate government inspection of painting operations upon buildings cannot be established. With regard to coach painting it considers that the safety of the painter can be insured by adequate inspection. Here employers of labor will probably prefer to escape from compliance with an onerous code of regulations by adopting leadless paints.

There can be little doubt that adoption of the recommendations made will mark a distinct advance in the prevention of lead poisoning, even though not so pronounced as if prohibition had been adopted.

Not the least interesting part of the report is that devoted to the effects of turpentine and turpentine substitutes. Evidence was placed before the Committee and also before the 1911 Committees to the effect that painters inhale the vapors of these substances and in consequence suffer from symptoms which have been confused with those of plumbism. That painters do in fact suffer from these vapors is accepted, but, after careful consideration, the committee concluded that "there is not sufficient ground to warrant us in accepting the view that turpentine poisoning is the cause of the leading symptoms commonly attributed to either acute or chronic lead poisoning, nor in attributing to the inhalation of fumes of turpentine and other thinners the occurrence of chronic Bright's disease." While agreeing with the first part of this conclusion, some hesitation may be felt about accepting the second part. Turpentine vapor appears able to set up acute nephritis and repeated attacks might be expected to terminate in chronic nephritis, unless those exposed establish some sort of immunity to vapor. Of such immunity there is no clear evidence.—E. L. C.

[1] Report of Departmental Committee on Industrial Paints. H. M. Stationery Office, 1923. pp. 66.

THE BLOOD AS GUIDE IN EARLY DIAGNOSIS IN LEAD POISONING. *R. Craik. Brit. Med. Jour., Jan. 20, 1923, vol. 1, pp. 103-104.*

In discussing the need for an early diagnostic sign for lead poisoning Craik states that in thirty cases of all kinds he has seen wrist-drop only once. He says also that "in the absence of serious anemia, punctate basophilia is more likely to be caused by lead than anything else," and suggests that "diagnosis should depend not on gross signs, but on appreciation of suspicious symptoms and investigation of blood and urine; whereas examination of the urine is a tedious process, the blood film is quick, easy, and almost as reliable." The disappearance of lead from the urine and of stippled cells from the blood occur at about the same time.

The author divided cases of lead poisoning into four groups: (1) industrial, invariably detected by experienced medical men at the works; (2) general practice cases, mainly occupational among painters, plumbers, etc.; (3) criminal, diachylon taken with the intention of producing abortion; (4) domestic, resulting from the contamination of food and drink. Occupational cases among painters seem to be increasing, largely as a result of the use of dry sandpapering. Craik states that he has known of a healthy man who contracted a case of acute plumbism in this way in a period of three weeks.—K. R. D.

CHANGES IN THE BLOOD PICTURE AFTER THE INHALATION OF LEAD DUST. *H. Rausch and L. Michaelis. Abstr. from Arch. f. Hyg.,*

1923, vol. 91, nos. 7 and 8, in München. med. Wchnschr., April 20, 1923, vol. 70, p. 512.

The authors produced stippling of the erythrocytes in rabbits by making them inhale air containing 5 to 6 mg. of lead carbonate dust per liter.

Changes in the blood picture were noted in three to four days. At the height of the experiment following exposure to lead dust for several days, 31,000 stippled red cells, and about 14,000 polychromatophilic cells per million erythrocytes were found. This blood picture persisted a week after lead inhalation ceased. After three weeks there were fewer stippled cells but still many polychromatophilic cells. The stippled cells were considered degenerated young erythrocytes.—A. S. M.

INHALATION OF LEAD DUST. *E. Nehring. Abstr. from Arch. f. Hyg., 1923, vol. 91, nos. 7 and 8, in München. med. Wchnschr., April 20, 1923, vol. 70, p. 512.*

In connection with the work of Rausch and Michaelis the author carried out other insufflation experiments with lead carbonate on rabbits. He found that only about half the amount of lead used by those authors was necessary to produce blood changes. The author carried out an experiment on himself in which he placed 10 mg. of lead carbonate in his mouth and nasal cavities for thirty consecutive days. Besides a pallor and stomatitis no symptoms appeared at the end of this time. Further studies were carried out with cats. It is worthy of note that many individuals of this species are very resistant to lead so that great care is necessary in determining toxic doses of lead.—A. S. M.

MERCURIAL STOMATITIS AS AN OCCUPATIONAL DISEASE. *L. Möller. Abstr. as follows from Klin. Wchnschr., 1923, no. 3, in München. med. Wchnschr., Feb. 9, 1923, vol. 70, p. 189.*

The author found mercurial stomatitis in 25 per cent. of the workers employed in a plant where rabbits' skins were prepared for felt hat manufacture. The solution used in the process was a mixture of mercury and nitric acid.—M. C. S.

THE OEDEMA OF PARA-PHENYLENEDIAMINE. *O. S. Gibbs. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., 1922, vol. 20, p. 221, in Med. Science, March, 1923, vol. 7, p. 530.*

Para-phenylenediamine is a dye which has been largely used for coloring hair and for dyeing furs, and a number of reports have been furnished of its poisonous qualities.

One of the features of its toxic action is the production of edema of the head and neck, and also of the tongue, the eyelids and the face. The author has experimented with the toxicity of the dye on cats, and shows that the edema which has hitherto been observed is the first stage in a general swelling. It is possible that a change in the composition of the blood is responsible for its effect.

DUST HAZARDS AND THEIR EFFECTS

NEW DATA ON AIR DUST DETERMINATIONS. *Margaret Ingels. Jour. Am. Soc. Heating and Ventilating Eng., March, 1923, vol. 29, pp. 177-193.*

An account of further developments in the Anderson and Armspach dust determinator is given. A portable field apparatus, of which a photograph is shown, weighs about 40 pounds, and consists in a fan directly connected to a 1/6 horse power motor and a filter across which resistance is measured at constant air flow with two manometers and a suitable valve for maintaining constant air flow. A simple method of bringing the test papers into equilibrium with the atmospheric conditions is described.—P. D.

PNEUMONOKONIOSIS OF METAL POLISHERS. *Heim, Agasse-Lafont, and P. Pouillot. Abstr. as follows from Bull. officiel direction recherches sci. ind. inventions, 1922, no. 35, pp. 562-572, in Chem. Abstr., April 10, 1923, vol. 17, p. 1290.*

Tests were carried out in shops not equipped with fans for removing the dust. In a poorly ventilated nickel polishing shop the air at the height of the workmen (4) contained 10 mg. of dust per cubic meter with a

trace of nickel. The dust from the floor contained 6.3 per cent. nickel and from the work benches 16.5 per cent. The air from two brass polishing shops contained, respectively, 10 and 30 mg. of dust per cubic meter, of which a trace and 0.002 mg. were copper. The dust from the floor contained, respectively, 48.9 and 35 per cent. copper, from the work benches near the grindstones 50.8 and 56.3 per cent., and from the benches near the buffers 23.5 and 10.7 per cent. The dust inhaled therefore consists almost entirely of the polishing material, with but traces of metal; but when lead is involved it gradually causes a latent saturnism. Clinical and radiological examinations on a large number of workmen are reported.—P. D.

Tuberculosis. Its Predisposing Causes. *F. C. Smith. U. S. Pub. Health Rep., April 13, 1923, vol. 38, pp. 777-784.*

"Marble and stone cutters, dry grinders, dry drillers and other workers who inhale hard dust are especially subject to tuberculosis. Soft dust from coal, limestone, wood, cotton, or wool is not very injurious. Many occupations in which the mortality from tuberculosis is high are not in themselves conducive to tuberculosis, but are occupations in which the employees are underpaid or overworked, or which are sought by the physically unfit, the improvident, or persons ignorant or careless of the measures necessary to keep healthy. Outside of certain dusty occupations, the lowest tuberculosis mortality is found among the callings which are characterized by comfortable living and moderate exertions."—B. C.

Some Notes on the Evolution of the Konimeter. *R. A. H. Flugge-de Smidt. Jour. Chem. Met. Mining Soc. S. Africa, 1922, vol. 23, pp. 77-86.*

This title is listed for the benefit of interested readers.—P. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

I. Report of the Sub-Committee Appointed by the Association to Collect Data on the Incidence of, and Mortality from, Tuberculosis and Miners' Phthisis among Natives. *Proceedings of the Transvaal Mine Medical Officers' Association. June, 1922, vol. 2, pp. 1-8.* II. Discussion on Tuberculosis. *Ibid., Aug., 1922, vol. 2, pp. 1-12. Reprinted from Tropical Diseases Bull., March, 1923, vol. 20.*

I. This report of the subcommittee appointed by the Association to collect data on the Incidence of and Mortality from Tuberculosis and Miners' Phthisis among Natives, while brief and, unfortunately, in its published form, without a schedule of the statistical findings referred to in the text, is still a document of the highest interest and importance; the discussion following the communication of the report to the Association is one that ought to be widely read not only by those interested in tuberculosis but by all those who desire to see the human individuals that constitute the Native Labour Contingents in our Colonies fairly treated.

The report discloses a rapid and terrible increase in the death-rate and repatriation-rate from tuberculosis throughout the mines, and a corresponding increase in the rates for silicosis and tuberculosis with silicosis.

"For tuberculosis the total number of cases (repatriated and died) in 1916 was 709, or a rate of 52 per 10,000; and in 1920 it was 1,138, or 72.5 per 10,000. Similarly, for silicosis, the numbers and rates were as follows: 115 or 8.4 per 10,000 in 1916; 180 or 11.5 per 10,000 in 1920. For tuberculosis with silicosis, they were 100 or 7.3 per 10,000 in 1916; 239 or 15.4 per 10,000 in 1920."

These figures speak for themselves. It is recognized by the subcommittee that, while improved diagnosis has certainly been operative during the period in question, this factor "cannot entirely account for the very marked increases that have taken place." It would indeed be strange if faulty diagnosis had been so marked, in the past, as to lose sight of the true nature of diseased conditions so advanced as to lead to death and repatriation on this formidable scale, and we cannot help reading into the restrained expression of opinion of the subcommittee a note not far removed from

irony when it is said that improved methods "cannot entirely account" for figures that ought to awaken the liveliest concern among all those responsible for the recruiting and employment of native labor in the Transvaal. When we learn, in the discussion, from such an authority as Dr. Irvine, that half of the total cases of pure tuberculosis are detected in the first six months and that, in his opinion, this means that "half of the total cases are boys with a pronounced lack of immunity to tuberculosis," we are already prepared for his conclusion that this loss occurring shortly after the start of work in the mines is due on the one hand to imported tuberculosis and, on the other, to tuberculosis originating in highly susceptible boys. For a possible explanation we turn to Dr. Dodd's contribution to the discussion. He says, "I think it is an example of the most vicious circle that was ever created in any country, and that is that we repatriate a very large number of highly infectious boys to their kraals and then we are surprised when their successors develop tuberculosis at an early stage of work." He adds his view that "if we are going to search for the cause of this increase we must go into the territories;" in that conclusion he is clearly right. Now here is a situation of great interest. The medical men of the Transvaal mines and the highly expert staff of the Bureau for the investigation of the diseases of the miners are at one in calling attention to a terrible mortality from tuberculosis among the native workers. It is fully realized that the native recruits to the mines are highly susceptible to the disease. The inference is clear that the repatriation of persons found to be suffering from this infective condition must necessarily be a serious danger to their associates when they regain the crowded and insanitary kraals of their native villages and mix once more with the admittedly highly susceptible populations of the interior—a vicious circle indeed. And yet the obvious remedy is ignored. Dr. Orenstein, in commenting on this point, says:

> There are a great many things that might be done in this country that apparently one cannot get done. For instance, we repeatedly urged on the Government the advisability of appointing some persons to go into the Territories and collect actual facts about tuberculosis in the Territories. This was one of the recommendations of the De Villiers Commission. . . . It was put forward again by private members during the present session and turned down by the Minister of Mines because there was no money, I understand.

It is really about time that those responsible for the lives of large numbers of subject races became aware of their obligation to listen to what the medical profession has to say. The policy of gathering together into the trammels of industrial work large detachments of susceptible persons and repatriating to their native homes the infected victims of a disease that is essentially one that spreads from man to man under home conditions, is not, on the face of it, a sound business proposition. On humanitarian grounds, too, something might be said of this "most vicious circle that was ever created in any country."

II. The discussion now recorded is the outcome of the desire expressed at the former meeting that information as to the actual state of things in the territories from which native mining recruits are drawn, and to which they turn if invalided, should be made available. In order to obtain light on this question, it had been decided to invite certain medical and other persons from among those working at the examination and selection of recruits in the territories to attend a meeting of the Society, and the guests included Dr. Welsh and Dr. Allen, Colonel Villiers, Chairman of the Native Recruiting Corporation, Ltd., Mr. Smith, Secretary of the Witwatersrand Native Labour Association, and Major Welsh of the Defence Force.

Dr. Welsh addressed the meeting and gave his views as to the actual conditions in the territories with regard to the medical inspection of recruits, the present distribution of tuberculosis among the natives, and the question whether there is much danger of spreading infection through the repatriation of tuberculous miners. The degree of precision in detection of early tuberculosis among these recruits may be gathered from the description given: "We stethoscope every boy that comes along:" "You have to go through from 60 to 100 boys in an hour or an hour and a half and by the time you get to the end the ear is not quite so acute in detecting sound;" "Many of the boys have crepitations and other signs in the chest." Now it is unde-

sible that a physician with experience of natives can weed out the acutely ill in the course of a very rapid inspection, and all who know Africans at first hand will agree that the general condition, the skin, the eyes, the teeth, and so forth, give admirable indications as to the general fitness of a recruit; but when it is a question of detecting early or even fairly advanced signs of pulmonary tuberculosis, not even that much trusted implement, the stethoscope, can be looked upon as likely to help much when sixty men have to be examined in an hour and a half; to say nothing of 100 in an hour. It is clear from what Dr. Welsh says that the examination is of little use so far as concerns tuberculosis, though it is probable that it serves to weed out the actual weaklings if conducted by a man, such as Dr. Welsh clearly is, of great experience in the inspection of recruits.

Next as to the prevalence of tuberculosis in the territories; here, too, the information available is far from sufficient. To quote Dr. Welsh, "the Native Territories are a large place; they cover an area of something like 17,000 square miles, nearly two-thirds the size of Scotland, with a population of about one million natives scattered over this area, an essentially rural population with no large native towns or cities; and as there are no statistics at all kept, it is impossible to give definite figures of any kind." It must therefore be admitted that nothing precise is known about this essentially important problem upon which the whole future of the staffing of the mines as well as the health and happiness of a subject race may perhaps depend; and all we can say is that the sooner steps are taken to find out about it the better.

While this absence of exact knowledge is deplorable, the paper read by Dr. Welsh throws much valuable light upon certain aspects of the tuberculosis problem and the impressions of an experienced doctor are often more significant than ill-compiled and badly collected statistics. It is of great interest to find that the impressions of both Dr. Welsh and Dr. Allen are to the effect that the disease is lessening in severity. Dr. Welsh is satisfied that he sees "less tuberculosis than ten years ago." Dr. Allen says, "I can speak for Zululand which I have investigated very thoroughly, and I can say that tuberculosis is certainly diminishing."

In the discussion which followed, Dr. Orenstein asked the pertinent question as to whether a process of gradual immunization was tending to produce among the natives a type of tuberculosis like that met with in Europe. In reply, Dr. Welsh said that at one time tuberculosis "seemed to be spreading so rapidly and seemed so hopeless to deal with" that he thought that the native question would soon settle itself. He goes on to say, "I am satisfied that the type of disease as it exists now is much more like that found in European countries though I do not think it has reached that type yet."

It is very interesting to speculate as to how far the introduction of infected persons into such a scattered community as the Native Territories can spread disease on the one hand or immunity on the other. We tend to the opinion that the rapidly fatal course of the disease in Africans is likely to lead to a rapid elimination of the infective subjects, thus lessening their powers of spreading infection; that the open-air life is likely to limit infection to the immediate circle of relatives inhabiting the same kraal as the patient, since close contact will only be possible indoors; and that the spread of the disease as well as acquired resistance to it are both likely to be slow. It seems, indeed, that but little resistance is as yet manifest among the natives that come to work in the mines, and it is certain that the Native Labour Corps serving in France were extremely susceptible to tuberculosis. It is probable that, in a population such as that described by Dr. Welsh as inhabiting the Native Territories, a balance of slight but still significant resistance and slowly spreading infection suffices to explain the diminution of cases noted, but that the degree of resistance is far too slight to be of account under the more intense conditions of infection met with at the mines.—E. L. C.

THE TREATMENT OF CUTANEOUS ANTHRAX. *J. C. Regan. Abstr. as follows from New York State Jour. Med., March, 1923, vol. 23, p. 113, in Arch. Dermat. and Syph., May, 1923, vol. 7, p. 654.*

The author gives a summary review of the etiology and distribution of animal anthrax and of previous methods of treatment of cutaneous anthrax in man. This is followed by a description of a method of treatment by

anti-anthrax serum alone, injected in part in the immediate neighborhood of the lesion and in part intravenously or subcutaneously. The statistics quoted by the author from his own cases and from the literature show that this method gives better results than any other. All surgical interference, whether by incision, excision, caustic or cautery, is condemned.—M. C. S.

THE TREATMENT OF BLOOD POISONING DUE TO ANTHRAX. *E. Baumann. Abstr. from Klin. Wchnschr., 1922, vol. 1, pp. 2472-2473, in Zentrlbl. f. d. ges. Hyg., March 25, 1923, vol. 3, p. 316.*

The author gives the clinical histories of two cases of severe general infection with anthrax which he treated successfully by means of intravenous injections of silver methylene blue (Merck's Argochrom). The author believes this to be the most successful therapy in the treatment of general blood poisoning caused by anthrax.—A. S. M.

VENEREAL DISEASES IN INDUSTRY. *J. J. Heagerty. Pub. Health Jour., April, 1923, vol. 14, pp. 175-179.*

This is an argument for (*a*) instructing employees in the dangers of venereal diseases and the possibility of grave complications where treatment is neglected; and (*b*) bringing to the attention of employers the economic loss due to venereal diseases, and the desirability of periodic examination of employees.

Industrial physicians give 2 to 10 per cent. as the venereal disease incidence among industrial workers but this is probably a low estimate because employees hide the disease where possible through fear of dismissal.

The economic loss from venereal diseases is made up of the following items:

1. Decreased efficiency of those suffering from such diseases.
2. Greater liability of syphilitic persons to other deleterious health influences.
3. Dangers to others from workers suffering from the cardiac and nervous forms of syphilis.
4. The development of neurosis and psychosis following minor injuries is apt to occur in the syphilitic.
5. Lesions ranging from primary to late tertiary syphilis are sometimes claimed as injuries and disabilities contracted in the course of work.
6. Greater tendency of syphilitics to accidents.—R. M. H.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

DERMATITIS FROM DYED FURS. *London Letter. Jour. Am. Med. Assn., April 14, 1923, vol. 80, pp. 1085-1086.*

"On the continent of Europe, cases of dermatitis due to dyed furs have been recorded in the last year. The lower part of the face and the neck show an erythematous, lichenoid or eczematous eruption. The fur responsible, known by the trade name of 'biberette,' is probably rabbit's fur dyed to imitate beaver. The dye is paraphenylendiamin, which has been used for many years to dye brown fur. In England, some cases of dermatitis supposed to be caused by the dye on cheap furs have recently been reported. The public health department of the London County Council has started an investigation, and a conference of representatives of the London Fur Traders' Association with the ministry of health has been arranged."—M. C. H.

METHODS OF PREVENTING SKIN AND EYE ACCIDENTS IN MOVING PICTURE STUDIOS. *Polack. Recherches et Inventions, March 31, 1923, vol. 4, pp. 317-320.*

This title is listed for the benefit of interested readers.

INDUSTRIAL DISEASES OF THE EYE. *Lancet. Jan. 27, 1923, vol. 204, pp. 192-193.*

According to Dr. T. M. Legge, H. M. Medical Inspector of Factories, amblyopia from lead poisoning, which used to be an important cause of industrial blindness, is now comparatively rare. "Since 1900 lead poisoning has diminished by more than one half. In the years 1905-09 there were found twenty cases of optic neuritis from this cause; in the corresponding period 1915-19 there were only six. These results, he says, have been largely accomplished by the advance made in locally

applied exhaust ventilation, by means of fans, to remove dust and fumes at the point at which they are produced, and so prevent inhalation of them by the workers. Before the war some cases were reported of amblyopia occurring in the manufacture of explosives in which dinitro-benzol was employed, but during the war blindness from this cause does not seem to have occurred. On the whole the risks of toxic amblyopia in connection with industrial processes are now fairly well guarded against."—K. R. D.

THE FIRST AID TO THE INJURED EYE. *C. P. Jones. Va. Med. Month., 1922, vol. 49, pp. 249-250.*

The author of this article recommends the following procedure for rendering the first aid to the injured eye:

1. Cocainization; a 4 per cent. solution of cocain should be dropped into the eye before examination.
2. Flush the eye with normal salt solution or boric acid solution.
3. Remove offending bodies with sterile cotton-wound toothpick or sterile spud.
4. If a wound is on the cornea, always touch with tincture of iodine and put in some borated vaseline and then put on a compress bandage for twenty-four hours.
5. Suture carefully all lid tears, approximating the lash line and seal with collodion, if possible.
6. In burns of the conjunctiva and cornea, cocainize thoroughly, remove carefully all the offending material, put in borated vaseline and put on a compress bandage.—M. C. H.

BUTYN AS A LOCAL ANESTHETIC IN MINOR SURGICAL OCULAR OPERATIONS. *E. L. Vernon. Am. Jour. Ophth., May, 1923, vol. 6, pp. 402-404.*

From his experience in 100 cases in which the patients were anesthetized locally with a 2 per cent. solution of butyn for the purpose of removing superficially lodged foreign bodies of the cornea and for other purposes, the author concludes:

1. Butyn is more expensive than cocain.
2. It produces hyperemia, while cocain produces ischemia.
3. It has no action on the pupil.
4. It produces as good or better anesthesia.
5. It has no effect on the corneal epithelium.
6. Four instillations of a 2 per cent. solution produce satisfactory anesthesia for all minor ophthalmic operations.
7. Tablets are quite slowly soluble, even in sterile hot water.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

INDUSTRIAL ACCIDENT PREVENTION. *G. E. Sanford. Safety Engin., Feb., 1923, vol. 45, pp. 41-42.*

This is a short review of lost time accidents of 40,000 factory workers. The point of operation or the point of the machine where the operator's attention is principally directed, together with the item of handling material, where the person handling it suffers an injury, shows the largest number of accidents in industry.—R. M. T.

NEW IDEAS FOR TEACHING SAFETY. *Factory, May, 1923, vol. 30, p. 561.*

"In an intensified drive to reduce the number of preventable accidents occurring in its plants, one corporation hit upon the idea of actually reproducing the accidents which had taken place during the preceding year. The use of motion pictures was rejected because it was felt that they would not have a natural effect which the concern desired most to produce. Instead, papier-mâché full-sized models of the various machines used in the plant were secured. Six of the company employees were then coached, much as if a play were to be given. After they had fully learned their parts, they were assembled in groups, one group at a time, in the various auditoriums. The accidents were then reproduced right in front of the men's eyes as they had actually occurred. So true to life were they that the initial reproduction for each group brought the men to their feet in protest against what they believed to be certain death or injury for the persons taking part.

When they found out that there was no danger, they relaxed in their seats, but the impression had been secured.

"A lecturer then pointed out how the accident could have been avoided, or how it was brought about through carelessness. In this connection, the lecturer made use of a papier-mâché leg of a man. The exhibit in this respect, of course, was ghastly, but most every man left, after the demonstration was concluded, with a promise to himself to be more careful in the future. And the practical result was that accidents during the following six months were reduced fully 40 per cent."
—M. C. H.

MENTAL FACTORS IN ACCIDENT PREVENTION. *W. R. Woodbury. Nat. Safety News, May, 1923, vol. 7, pp. 25-27.*

Co-operation between the safety engineer and the industrial physician is essential to effective accident prevention. An understanding of the mental causes of an accident is of value, not only as an aid to the recovery of the victim, but also as an aid to the prevention of further accidents.

Dr. Woodbury discusses mental causes of accidents under the following headings:

Ignorance.
Inexperience.
Mental limitation.
Predisposition.
Faulty attitudes.
Mental sets—faulty attitudes which have become fixed and influence the working of the person's mind in all matters.
Excitability.
Subconscious errors.
Faulty habits, hurry.
Inattention.
Distraction.
Preoccupation.
Mental sickness.
Depression.
Sickness, disease.

Complete rehabilitation after the injury cannot be achieved through measures directed solely toward physical recovery. Careful attention must be given to mental and emotional damages. If these are overlooked in the beginning they are less easily overcome and hold back recovery.

Dr. Woodbury believes "that every worker should have a physical examination before taking employment, the examination including a record of the physical condition, personal qualities and intelligence. A full introduction to the work, its demands and dangers should be given to every new employee. Compensation organizations should have complete first hand information of the home and economic conditions of the claimant from the beginning of his injury. Wise vocational rehabilitation is essential in securing satisfactory convalescence from accident injuries."
—M. C. S.

PUTTING ACCIDENTS TO ROUT IN THE FURNITURE PLANT. *Nat. Safety News, April, 1923, vol. 7, pp. 9-11.*

This article deals with the co-operative efforts of small furniture plants employing less than 1,000 men, in Grand Rapids, Michigan, to reduce the number of accidents and protect the health of their workers. The Furniture Manufacturers' Association, which includes nearly all furniture manufacturers in this district, maintains a fully equipped hospital with a staff of experienced men. This central medical office co-operates with and gives instructions to the first-aid departments of the different factories. An example follows of a company employing an average of 400 workers which has been organized for safety, in spite of the fact that the size of the plant does not permit an elaborate safety organization nor even a safety man his entire time.—R. M. T.

ACCIDENTS AMONG WORKMEN IN PUBLIC UTILITIES. *Berlin Letter. Jour. Am. Med. Assn., April 21, 1923, vol. 80, pp. 1162-1163.*

According to a government survey of workmen in gas and electric plants and in water works, the health conditions among workmen tending furnaces and retorts are largely dependent on the mode of manufacture used in retorts and furnaces, which in the older plants were constructed much differently from the modern makes. In the latter the filling and emptying are done by machinery. The physical labor involved is thus materially decreased, and fewer workmen are required to do the work. Whereas formerly the hours of work in the gas plants were often very long, now the Berlin gas plants require only six hours work a day of their furnace work-

ers, with the exception of Saturday and Sunday, when eight hours are demanded. From the records of health insurance societies of manufacturing plants in the city of Berlin, it appears that the incidence of sickness among workmen in gas plants, which in 1913 was 45.4 per cent. less than that of other members of the health insurance societies, in 1920 was 74.7 per cent. higher than that of other members. The usual explanation given for this is the fact that now the workmen in gas plants draw full pay during periods of sickness, and receive in addition the sick benefits from the health insurance societies, so that sickness means virtually an increase in income. Among the causes of illness, accidents, catarrhal affections of the respiratory passages and rheumatic affections play a big part.—M. C. H.

ACCIDENTS IN MINES. *G. S. Rice. Am. Labor Legis. Rev., March, 1923, vol. 13, pp. 31-37.*

The rate for all classes of accidents in mining coal in the United States during 1922 was 4.273 per million tons, as compared with 3.924 in 1921. The death rate in British coal mines is far lower. The British fatal accident rate for every 1,000 men is about 1.0 to 1.3, while in the United States the rate for every 1,000 workers is about 3.9 to 4.6 each year. Among the factors responsible for the lower rate in British coal mines the following are the most probable: greater experience possessed by the miners; slower speed with which the men work; less extensive use of machinery; shale dusting of mines and better timbering.

The Bureau of Mines in this country cooperates as far as possible with state officials and bureaus. The field covered by such cooperation is here summarized. Certain state rights involving state control of mineral resources make it difficult, however, to co-operate unless invited. It would be highly desirable if there were a greater uniformity of laws relating to the mining industry.—L. A. S.

COAL MINE EXPLOSIONS DEMAND PRECAUTIONS. *H. F. Bain. Safety Engin., Feb., 1923, vol. 45, pp. 37-38.*

The coal industry has not for years suffered as many big disasters as have occurred in the few months since the resumption of mining after the strike. In this time there have been, in the bituminous mines, six explosions killing 185 men and injuring more than 150 others. The entire country is aroused and investigations now under way will determine the causes of the accidents and what, if anything, might have been done to prevent them.

The maximum output required to meet the heavy demands of the winter trade; the seasonal hazards, which are greater in the coal industry during the winter months; lessening of morale throughout the industries as a result of the strike; change in personnel at the mines; the shifting of miners to camps where they are not familiar with the dangers; and the lack of that discipline which is necessary to prevent disaster, have probably influenced the result.

It is the immediate duty of each operator and each mine worker to do all in his power to prevent accidents. The prevention of such accidents as falling roofs and coal falling at the working face is almost entirely a matter in the hands of the individual worker, but the matter of explosions is a collective responsibility of the individual and the operator.

Spreading of explosions is caused by coal dust as demonstrated by the Bureau of Mines, and the responsibility for this rests with the mine management. The Bureau of Mines has been making a study of coal dust explosions since 1911, and since that time more than 500 experimental explosions have been produced. Research work conducted to devise methods for the prevention of widespreading of minor initial explosions has demonstrated two effective methods. The first is to wet the dust thoroughly so that it cannot be thrown up into the air; the other is to dilute the coal dust with shale dust or limestone dust, or any non-inflammable dust so that the explosion will not pass from point to point even though a dust cloud is raised. Many things should be done to lessen the amount of coal dust, but it is impossible to prevent entirely its formation in bituminous mines. Treatment methods of some sort are necessary, as 0.81 ounce per cubic foot of air space in mine passageways will propagate an explosion.

Bulletin 167 of the Bureau of Mines gives detailed information regarding the explosion tests produced up to May 22, 1918.

As a result of the educational campaign inaugurated by the Bureau of Mines and the co-operation of the miners and operators, the number of explosions and deaths had decreased in the past few years to such an extent that, until the present series of disastrous explosions, the Bureau of Mines felt that dangers from this source were being eliminated.—G. N. T.

MINE SAFETY IN THE SOUTHWEST. *C. L. Colburn. Nat. Safety News, April, 1923, vol. 7, pp. 25-26.*

A review is presented of the methods used for attaining safety in the metal mining industry of the southwest. It is of interest to note that though the material worked and the methods used are practically the same, there seem to be no standard safety practices. Examination of accident records of mines having well-organized safety departments shows that they are no better than those of other mines where the safety is handled by the foreman and shift bosses.—R. M. T.

COKE-OVEN ACCIDENTS IN THE UNITED STATES DURING 1921. *W. W. Adams. U. S. Bur. Mines, Tech. Paper 318, Washington, 1922.*

This report, by W. W. Adams of the United States Bureau of Mines, of the accidents at coke ovens includes the following tables: number and classification of injuries in coke ovens of the United States from 1916 to 1921; number of employees, days of labor performed, fatalities and injuries in coke ovens in the United States, 1916-1921; number of fatalities and injuries and rate per 1,000 300-day workers for the year ending December 31, 1921, by causes.—L. A. S.

SAFETY DEVICES IN THE TEXTILE INDUSTRY. *B. Fisher. Safety Engin., Jan., 1923, vol. 45, pp. 12-13, 27-29.*

The use of mechanical safeguards whenever possible is one of the first principles of safety work, for educational work is reduced to a minimum where permanent safety devices have been installed. Although most accidents in mills with modern equipment are not due to machinery, there are many mills using ancient equipment and not alive to the importance of safety work, where mechanical injuries are too frequent. Many instances are enumerated in this article in which the use of simple interlocking gear-covers, screens for stopping flying shuttles, guards for belts, and safety treads around machines, will create a positive check on accidents and lessen the strain upon human intelligence, caution and good-will.—G. N. T.

INDUSTRIAL SURGERY

CRUSH FRACTURES OF SPINE. *J. W. Wallace. Abstr. from Jour. Bone and Joint Surgery, Jan., 1923, vol. 5, p. 28, in Jour. Am. Med. Assn., March 10, 1923, vol. 80, p. 724.*

Eighty-two cases of fracture of the spinal column are analyzed by Wallace. A great majority of these cases had been unrecognized and consequently untreated; most of them were coal miners, in whom there was forcible flexion of the spine from falls of slate, roof coal, etc. In nine cases the history of the injury gave no definite forcible flexion of the spine and the mechanism of the fracture could not be determined. In sixty-seven cases a definite history of forcible flexion of the spine was given. In every case in which the history showed that the patient was caught in a flexed position and had his spine flexed so that the head was forced between the legs, a fracture of one of the lower vertebrae was found. In twenty-three cases there were fractures elsewhere in the body. Fracture of the transverse processes was the most common injury. This occurred on either one or both sides of the vertebra crushed; sometimes the vertebra above and below. Fracture of the spinous processes was rather rare, having occurred in only three cases. Fracture of the articular processes occurred in one case. The data on the complaints of the patients are not complete, but it appears that in half the cases the patients not only had pain in the back, but also had pain referred to other parts, generally the legs, also to the hips, chest, abdomen, head, etc. A few patients had no pain in the back, but had referred pain. A few had no pain whatever.—M. C. H.

So-Called Chauffeur's Fracture. *P. Stephens. Calif. State Jour. Med., March, 1923, vol. 21, pp. 115-117.*

Although self-starters have been generally adopted as equipment on pleasure cars, it is still necessary for the operators of most heavy trucks and light delivery cars to crank their machines. Wrist fractures due to back-firing still form a considerable part of cases coming to the attention of the surgeon. The mechanical factors in the production of such injuries do not differ materially from those occurring in a fall with the hand outstretched. The majority of these injuries prove to be minor in character—usually small fissures with no deformity or defect in alignment or position. Perhaps the commonest of these is the fracture of the radial styloid process. Another, the so-called cortical fracture, is sometimes difficult of detection. Two important forms are the so-called typical or classical Colles' fracture of the wrist and the impacted variety in older subjects. In spite of the physician's best efforts, these very often result in impaired flexion, pronation, and supination.

Treatment in the majority of cases is simple, consisting in the application of a single splint applied to the palmar surface, and reaching from the elbow to the middle of the palm. It is padded to conform to the normal arch of the forearm, and held in place by adhesive straps at the wrist and below the elbow, the whole firmly bandaged. Treatment of the "classical" fracture is more difficult, requiring a short anesthetic and an increase of the deformity before the short fragment is set in place. A molded plaster splint is recommended. Early passive motion and massage are necessary. Three weeks is a fair average for the wearing of splints. The essentials of treating such injuries consist in complete reduction immediately after the injury, appreciation of the factors of treatment and after-treatment, very early motion, and short time of immobilization.—G. N. T.

Paraffin Treatment of Burns. *L. Rebaudi. München. med. Wchnschr., Feb. 9, 1923, vol. 70, p. 179.*

Rebaudi outlines his method of treating burns with liquid paraffin and describes the apparatus which he uses for this purpose.—M. C. S.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Labour and Nutrition. IV. On the General Metabolism of Several Japanese Workwomen. *J. Sakamoto. Abstr. as follows from Jour. Biochem., 1922, vol. 2, pp. 73-102, in Med. Science, May, 1923, vol. 8, p. 159.*

The author conducted general metabolism experiments on three female Japanese who were engaged in domestic and factory work. The minimal amount of nitrogen per kilo body-weight with laboring hours of eight to ten varied from 0.55 to 0.97 gm. When the nitrogen requirement was administered, in one case entirely as a vegetable diet, the amount of nitrogen required was less than when the diet was a mixed one. The author found that the most favorable combination of foodstuffs is, roughly speaking, lipoids 0.13 to 0.2 per cent., proteins 8 to 9 per cent., fats 1.6 per cent., and carbohydrates 77 to 78 per cent. This formula was very close to one obtained by him in experiments on workmen. The caloric requirements per kilo body-weight per day varied between 43 and 56 calories.—M. C. S.

Studies in Industrial Physiology. *Internat. Labour Rev., Dec., 1922, vol. 6, pp. 988-992.*

A brief review of a series of "Notes et Mémoires" published by a committee to study output and fatigue from the Lannelongue Institute of Social Hygiene of Paris, is given.

(*a*) Frois and Caubet present an extensive study of industrial fatigue. These authors criticize the common tests for industrial fatigue, such as output curves, sickness curves, respiratory exchange of gases, etc. A study

of the work of women engaged in bundling at the Ripault powder mills is presented. This occupation consists in repeated operations which require twelve different movements in a short time—16½ seconds on the average. The actual energy output is relatively slight, but the work is very trying when long continued. Thus mechanical measurement of the job is no criterion of the fatigue occasioned by it. Physiological tests showed mild muscular fatigue, diminished auditory acuity, markedly increased reaction time especially late in the week indicating cumulative effect of fatigue, and an increase in arterial pressure and pulse rate. The starting effort is greatest and decreases during the day, showing an adaptation of the system to the work. After work both the arterial pressure and pulse rate fall rapidly to a subnormal level and subsequently return gradually to normal. It is, therefore, important to take measurements immediately after work is finished.

The authors point out that fatigue is general and that its effects cannot be localized, nor can they be properly studied by any single test. They conclude that rapid processes carefully studied and controlled are not necessarily detrimental to the well-being of workers. The main question in any occupation is whether the methods adopted for its execution are consistent with normal activity on the part of the worker.

(*b*) Lapiere describes an electrical muscular test for the study of industrial fatigue. He finds that in fatigue the time required for a given current to produce muscular excitation is sufficiently increased to serve as a sign and measurement of fatigue.

(*c*) Pieron describes three psychological tests for fatigue. He bases his studies on the fact that prolonged work may affect the cerebral functions either indirectly by affecting the system as a whole or directly, owing to the participation of higher centers in the work itself.

(*d*) The occupation of rivet driving was studied by Frois. The work was simple, uniform, and rather heavy, and produced considerable physiological disturbance of the circulatory and respiratory systems, and it required robust adult workmen. The authors found that human energy was, on the whole, badly utilized in the work. The output was extremely variable and depended on the nature of the job, the make-up of the gang, and on periodical rest. There was a fall in output of 33 per cent. from the first to the fourth hour. The output was made practically constant for the four hours by the introduction of ten-minute rest periods in each hour. The author points out that the substitution of machinery for hand labor in this occupation would be a great economic advantage.

(*e*) Mague reports an exhaustive study of the modifications of respiratory phenomena caused by muscular work. The author finds that persons accustomed to muscular work can eliminate higher concentrations of carbon dioxide and thus economize pulmonary ventilation. When work is carried beyond physiological limits the normal chemical processes of the tissues are disturbed, and incompletely oxidized substances—as well as increased carbon dioxide—tend to produce exaggerated ventilation. Fatigue has little, if any, effect on the respiratory phenomena caused by the work. The value of the respiratory method of studying the efficiency of the human machine in different types of work and under various conditions is pointed out.

One general principle can be deduced from several studies—namely, that to work economically the human machine should work rapidly and intermittently.—A. S. M.

STUDIES IN EXHAUSTION: IV. PHYSICAL TRAUMA. *G. W. Crile. Arch. Surg., March, 1923, vol. 6, pp. 489-524.*

The author concludes as follows:

1. The effects of physical injury, especially of abdominal trauma, have been studied by (*a*) observations of the blood pressure; (*b*) measurements of the constituents of the blood; (*c*) histologic studies; (*d*) measurements of the H-ion concentration and of the alkali reserve of the blood; (*e*) estimations of the iodin content of the thyroid gland; of the epinephrin content of the suprarenals and the epinephrin activity; of the pituitrin activity; of the glycogen content of the liver and of voluntary muscle; (*f*) measurement of the electrical conductivity of the brain and the liver; (*g*) direct measurements of the temperature of the brain and the liver; and (*h*) clinical observations of patients after physical trauma received by accident or in war, or in surgical operations.

2. All of these lines of investigation indi-

cate that changes in the central nervous system—primarily in the brain—constitute the fundamental cause of the exhaustion and shock which follow physical trauma.

3. The experimental evidence indicates that the liver, and possibly the suprarenals, is linked with the brain in the cycle of exhaustion-producing changes which are initiated by the changes in the brain.

4. These studies present no evidence that any primary change in the distribution or constitution of the blood is produced by physical trauma alone. When such changes were demonstrated, they were end-effects, not causative factors, of shock or exhaustion.

5. A limited group of experiments indicates that, under anesthesia at least, the suprarenals do not respond to the stimuli of physical trauma by any increase in their output.

6. The essential cause of exhaustion from physical trauma is identical with that of exhaustion from insomnia, by emotion and by exertion, as presented in the preceding studies in this series.—M. C. H.

EXAMINATION OF CERTAIN PROPOSED TESTS FOR FATIGUE. *F. S. Lee and J. D. Van Buskirk. Abstr. as follows from Am. Jour. Physiol., Jan., 1923, vol. 65, p. 185, in Jour. Am. Med. Assn., March 3, 1923, vol. 80, p. 653.*

Lee and Van Buskirk examined experimentally a considerable number of physical tests which either have been proposed, or might be employed, as indicators of fatigue in human beings. They failed to find in any of the tests a reliable criterion of the daily physical fatigue of the individual from such physical exertion as a walk of fourteen miles.—M. C. H.

ATTENTION, DISTRACTION AND FATIGUE. *F. C. Dockeray. Abstr. as follows from Jour. Compar. Psychol., Oct., 1922, vol. 2, pp. 331-370, in Jour. Personnel Res., Feb., 1923, vol. 1, p. 470.*

This article includes the unfinished work of Miss Emily Berger, University of Kansas, and the work of F. C. Dockeray who concluded the experiment. The work was designed to study certain factors involved in the capacity for mental work, or activity, under various conditions of distraction and mental and physical fatigue.

The sounder test was used in various forms all based upon some definite reaction to a given signal or stimulus. One type is that in which the subject pressed a key upon hearing a particular sound.

The conclusions arrived at are, briefly:

1. The sounder test is a severe test of ability to attend to a single stimulus or discriminate slight differences in a group of nearly equal stimuli, but due to the narrow span of attention required, a subject may effectively master the situation under unfavorable conditions.

2. The sounder test is fairly well adapted to determining individual differences in ability to overcome distraction.

3. The test may be adapted to determine individual differences in attention to an auditory stimulus.

4. There was no noticeable fatigue of the sense organs involved.

5. The sounder test should prove a satisfactory test for the investigation of the effects of fatigue, low oxygen, ventilation, tobacco and drugs.—M. C. S.

TREATMENT OF CHRONIC FATIGUE INTOXICATION. *E. H. Ochsner. Abstr. as follows from Ill. Med. Jour., Feb., 1923, vol. 43, p. 125, in Jour. Am. Med. Assn., March 24, 1923, vol. 80, p. 874.*

Ochsner reiterates his belief that chronic fatigue intoxication is a distinct disease entity with definite symptoms. In the treatment of patients suffering from this affection, four objects must constantly be kept in mind: (1) maintain or improve the nutrition of the patient as the individual case may demand; (2) prevent the further accumulation of fatigue material; (3) ameliorate the symptoms as much as possible; and (4) remove the already accumulated fatigue material. In nearly all of the severe cases the patients suffer much from hyperchlorhydria, eructation and belching of gas, and constipation. Proper diet, rest, and looking after the symptoms as they arise, sometimes make these patients more comfortable, but these alone will never cure them. The active treatment should have for its object the elimination of all accumulated fatigue material in the shortest possible time with the least risk and discomfort to the patient. Good air, both night and day, is abso-

lutely essential in order that the products of fatigue may be properly oxidized and converted into a form which may be easily eliminated. Suitable baths are also valuable adjuncts. In the extreme cases the use of castor oil is very important. Some of these patients can be saved only if they are given one ounce of castor oil every evening on retiring or the first thing in the morning, in order that the end results of the faulty digestion may be cleared out of the gastro-intestinal tract daily and the fatigue material which may have found its way into the gastro-intestinal tract after massage may also be removed. The measures already mentioned must be supplemented by carefully supervised, intelligent massage. When the patient is completely relieved of all of the symptoms and of all of his fatigue spots, the time for physical exercise and physical re-education of the atrophied muscles has arrived. The exercises must be increased gradually, always stopping short of exhaustion. Later more strenuous exercise such as golf, tennis, walking, rowing are indicated and moderate fatigue encouraged, but exhaustion guarded against in order that a relapse may be averted.—M. C. H.

BLOOD DESTRUCTION DURING EXERCISE. III. EXERCISE AS BONE MARROW STIMULUS. *G. O. Broun. Abstr. as follows from Jour. Exper. Med., Feb., 1923, vol. 37, p. 187, in Jour. Am. Med. Assn., April 14, 1923, vol. 80, p. 1100.*

When a dog kept for a long time under sedentary conditions is exercised continuously for several weeks, Broun says, a decrease in cell volume occurs in the first or second week of exercise, but usually by the end of the third week the loss has been made up. Apparently by this time the hematopoietic tissues have adapted themselves to the increased demands made on them by the hastened rate of destruction. There is, furthermore, some anatomic evidence that such is the case.—M. C. H.

IMMEDIATE EFFECT OF HEAVY EXERCISE (STAIR-RUNNING) ON SOME PHASES OF CIRCULATION AND RESPIRATION IN NORMAL INDIVIDUALS. I. OXYGEN AND CARBON DIOXID CONTENT OF BLOOD DRAWN FROM CUBITAL VEIN BEFORE AND AFTER EXERCISE. *C. Lundsgaard and E. Möller. Abstr. as follows from Jour. Biol. Chem., Feb., 1923, vol. 55, p. 315, in Jour. Am. Med. Assn., April 21, 1923, vol. 80, p. 1175.*

The oxygen and carbon dioxide contents of blood from a cubital vein were determined by Lundsgaard and Möller in a series of normal persons at rest and within one minute after heavy exercise. The exercise consisted of running up and down a flight of stairs five times. The muscles of the arms were not used. In sixteen subjects the oxygen of the venous blood showed a decrease far outside the variations found during rest. In one subject, the figures for the oxygen content during rest and after exercise showed no difference. The carbon dioxide content showed only small variations. In some instances a decrease, in others a small increase was found. Different possible explanations of these observations are discussed briefly as an introduction to additional investigations.—M. C. H.

CIRCULATION AFTER CESSATION OF WORK; CALCULATION OF CIRCULATION RATE EXPERIMENTS ACCORDING TO NITROUS OXID METHOD. *J. Lindhard. Abstr. as follows from Jour. Physiol., Dec., 1922, vol. 57, p. 17, in Jour. Am. Med. Assn., March 10, 1923, vol. 80, p. 727.*

The results of experiments dealing with the oxygen consumption per minute, the oxygen absorption per minute, the oxygen absorption per liter of blood and the pulse rate within the first twenty minutes after cessation of muscular work in two male subjects are given by Lindhard. The minute volume of the heart as calculated from the experimental data shows that the circulation rate decreases rapidly during the first two minutes and then more slowly following a rather complicated curve.—M. C. H.

THE HEART AFTER SEVERE PHYSICAL TRAINING. *K. Secher. Abstr. as follows from Hospitalstidende, Copenhagen, Jan. 17, 1923, vol. 66, p. 61, in Jour. Am. Med. Assn., March 31, 1923, vol. 80, p. 970.*

Secher tabulates the findings from twenty-two animals. His experiments confirm anew the remarkable power of adaptation of the heart to extra work and to return to normal conditions.—M. C. H.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

HYPERTENSION AFTER ELECTRIC INJURY. *W. Pfalz. Abstr. as follows from Deutsch. med. Wchnschr., Dec. 8, 1922, vol. 48, p. 1647, in Jour. Am. Med. Assn., Feb. 10, 1923, vol. 80, p. 439.*

Pfalz describes the case of a young man with periods of hypertension after a severe injury by electricity. Pfalz attributes it to an increased irritability of the vasomotor center, due to the injury.—K. R. D.

A CASE OF SUBCUTANEOUS EMPHYSEMA DUE TO PNEUMATIC RUPTURE OF THE RECTUM. *P. J. Finnegan. Boston Med. and Surg. Jour., Jan. 4, 1923, vol. 188, p. 15.*

A worker in the snagging room of a foundry was accustomed to being "dusted-off" at the end of the working day with a high-pressure (70 to 80 pounds per cubic inch) air stream. On the day of the injury, this man was being "dusted off," and was standing with legs spread apart while another employee worked the hose. When the back of his trousers was being cleaned, the man jumped into the air and complained of pain in the rectum.

The symptoms resulting were dyspnea, cough, cyanosis, and crepitus from the angles of the jaws to the toes. Peritoneal involvement was absent, and there was no occasion for a laparotomy to discover just where the damage occurred. The patient recovered and was back at work in five days.—B. C.

RESEARCH ON BURNS FROM INTENSE HEAT. *H. Schridde. Abstr. as follows from Klin. Wchnschr., Dec. 23, 1922, vol. 1, p. 2563, in Jour. Am. Med. Assn., March 10, 1923, vol. 80, p. 733.*

Schridde found that burns due to electric currents are histologically identical with those provoked by application of great heat (cautery).—M. C. H.

HEAT, COLD AND HUMIDITY

THE KATA-THERMOMETER. *R. A. Jacob. Ann. d'hyg., March, 1923, N. S. vol. 1, pp. 152-156.*

A brief review and discussion of the development and use of the kata-thermometer.—P. D.

PHYSIOLOGICAL EFFECT OF HIGH TEMPERATURES AND HUMIDITIES WITH AND WITHOUT AIR MOVEMENT. *R. R. Sayers and D. Harrington. U. S. Bur. Mines, Rep. Investigations, Ser. No. 2464, April, 1923, pp. 7.*

The paper deals with "the effect on body temperature and pulse rate in still air as compared with moving air of temperatures from 90° to 100° F. and 100 per cent. relative humidity, the subjects at rest." The work was done in metal mines which were selected because of the high temperatures and humidities prevailing. Five subjects, two of whom were the authors, were examined at rest. Blood pressure, pulse rate, rectal body temperature, symptoms of dizziness, headache, weakness, perspiration, etc., were recorded. Air temperature and humidity were taken by sling psychrometer, and air velocity by anemometer. From the five different tests described of about one hour's duration each the authors conclude that:

"The untoward effects upon man of almost saturated air with temperature above 90° F. and below 98° F. are much less if the air is moving than when it is still. Further, the output or work that can be done is greater when the air is moving than when it is still, with the above temperature and humidity.

"No beneficial effects were found by moving saturated air at 98.6° or 100° F. even at high velocities and there was apparently some disadvantage."—P. D.

SOME PHYSIOLOGICAL REACTIONS TO HIGH TEMPERATURES AND HUMIDITIES. *W. J. McConnell and F. C. Houghten. Jour. Am. Soc. Heating and Ventilating Eng., March, 1923, vol. 29, pp. 131-163.*

In co-operation with the Bureau of Mines and the Public Health Service the Research

Laboratory of the American Society of Heating and Ventilating Engineers is undertaking a study of the physiological effects of various temperatures and humidities (1) on human subjects at rest in still air; (2) on the subjects at rest under varying air velocities; (3) on the subjects performing mental or physical work; and (4) on the subjects at work but in still air. The present paper deals with only the first part of the investigation and with temperatures above 90° F.; it therefore applies more directly to industrial conditions than to those met in everyday life.

Both in the completeness of their equipment and the thoroughness with which their data were recorded the writers have left little or nothing to be desired. Two separate thermally insulated chambers, which can be kept at any desired degree of humidity, heat, or air motion, served as the experimental chambers. Rectal temperatures, pulse, respiration, and blood pressure were automatically recorded for each subject, and at intervals unknown to him. Basal metabolism, sweat analyses, blood counts, sugar and hemoglobin content of the blood, and sugar and albumin content of the urine were also determined. The tests were of about three hours' duration unless the conditions were too severe.

In a brief abstract it is impossible to do justice to either this or the subsequent paper (see next abstract). The originals should be consulted for detailed information. The authors' summary is quoted from their paper:

1. There is an inability of the body at rest and in still air to compensate for saturated atmospheric conditions exceeding 90°F.

2. The physiological effects resulting from exposure to high temperatures and humidities depend upon both the wet and dry bulb temperature readings.

3. The exhaustion and weakness following subjection of human beings to a very high temperature and humidity for a short period are not so severe as in subjection to a moderately high temperature and humidity, but for a longer period.

4. The highest dry and wet bulb temperatures attained and length of time endured in the experiments are as follows:

Dry Bulb	Wet Bulb	Relative Humidity	Time, Minutes
112.5	112.50	100	35
120.2	104.02	60	40
147.0	108.40	30	45
157.0	100.43	15	45

5. The pulse rate, rather than the rise in body temperature, apparently determines the extent of the discomfort experienced by the subject. Subjects became very uncomfortable after the pulse rate exceeded 135 pulsations per minute, and complained of unbearable and distressing symptoms when the pulse exceeded 160 per minute. The highest pulse rate recorded was 184 per minute.

6. The systolic and diastolic blood pressure fell with moderate increase in temperature and humidity, and the systolic rose and the diastolic fell, thus increasing the pulse pressure, in high temperatures and humidities.

7. The curve of rectal temperature shows a close parallelism with the curve of the temperature of the test chamber at any constant humidity.

8. Subjection to high temperatures and humidities produced no marked change in the respiratory rate.

9. Loss of weight varies with the individual, the loss increasing with the length of exposure to high temperatures and with the severity of the test.

10. The hemoglobin content of the blood increases proportionately to the loss in weight.

11. An estimation of the changes in the sugar content of the blood proved negligible.

12. A relative increase in the blood count was found, but not an absolute one.

13. The rate of sweating varies with the atmospheric conditions. The substances lost from the body through the sweat do not change in their proportions to one another.

14. Examination of the urine was negative for albumin and sugar, and specific gravity increased.

15. The sweat is the chief factor in producing the irritation and inflammation of the eyes.

16. Ice water, even when large quantities were swallowed, did not cause cramps under the conditions of the experiments.—P. D.

J. I. H.
July, 1923

DETERMINING EQUAL COMFORT LINES. *F. C. Houghten and C. P. Yagloglou. Jour. Am. Soc. Heating and Ventilating Eng., March, 1923, vol. 29, pp. 165-176.*

It has been contended by many and disputed by others that under normal conditions of indoor living, where the permissible range in wet and dry bulb temperatures is relatively slight, a drop in wet bulb temperature should be accompanied by a rise in the dry bulb in order that the room may feel the same as one with a higher wet bulb and a lower dry bulb temperature. The same arguments have been applied to outdoor conditions where the temperature ranges are greater. It has also been contended that the wet bulb temperature is the more important in determining comfort.

The paper by Houghten and Yagloglou answers these questions and in a striking and convincing manner. The two rooms, mentioned in the previous abstract, were used for all their experiments. One room was maintained at a desired wet and dry bulb temperature and the other varied until judges, passing from one room to the other, agreed that the rooms appeared to be at the same temperature. A series of such points plotted on a standard psychrometric chart gives lines which appear to be straight. Adjacent lines vary but little in slope although lines plotted at low wet and dry bulb temperatures make appreciable angles with lines plotted at high temperatures.

These lines have been called by the authors *equal comfort lines* or *effective temperatures.* They point out that the physiological reactions described in the previous paper follow these effective temperature lines very closely. Increase in pulse rate, rise in rectal temperature, and loss of body-weight per unit time interval are plotted against effective temperatures and show regular curves, while the same items plotted against either wet or dry bulb temperatures show but little regularity.

It is not professed by the authors that this interesting work establishes optimum conditions; this was not the purpose of the investigation. The most striking features of their paper are summarized in their conclusion, which is as follows:

"Comfort as determined by both sense and physiological reactions depends solely upon effective temperature. At 32 deg. the effective temperature line coincides with the dry bulb temperature line, hence in this particular case dry bulb temperature is the only factor in determining comfort.

"In the comfort zone comfort depends equally on wet and dry bulb temperatures.

"At about 132 deg. the effective temperature coincides with the wet bulb temperature and for this case the wet bulb temperature is the only factor.

"Below 32 the effect of humidity is reversed. The lower the humidity the greater the feeling of warmth."

A striking feature is the extraordinary sensitivity to variations in these effective temperature lines. All subjects were readily able to detect differences of as little as 1° between the two rooms.—P. D.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

ODORS: THEIR SANITARY SIGNIFICANCE AND THEIR ELIMINATION. *J. R. Earp. Am. Jour. Pub. Health, April, 1923, vol. 13, pp. 283-293.*

This paper gives a general discussion of the physiology of the sense of smell and the effect of odor on health but it arrives at no very definite conclusions. There has as yet appeared no satisfactory classification of odors or method of measuring their intensity. Too much must be left to the purely subjective judgment dependent upon extreme personal variations. Aside from certain directly toxic gases, like hydrogen sulphide, the direct effect of odors upon health has not in any case been shown to be seriously injurious. Odor, however, may be significant as a clue to some event of sanitary importance; for example, the coal gas odor which suggests inodorous carbon monoxide. The elimination of such odors is to be desired through the removal of the danger which they indicate. Deodorants do not eliminate odors: they disguise them. Since nuisances vary enormously not only with the operations that give rise to them but

also with localities in which they are situated, it is not possible to lay down specific rules for the elmination of all odors. Existing methods all depend on one or the other of the following principles.

1. Removal of the source of offense.
2. Removal of putrescible by-products.
   a. By sedimentation.
   b. By filtration.
   c. By skimming.
   d. By biological treatment.
   e. By oxidation.
3. Oxidation of the offending gases.
   a. In solution.
   b. By combustion.
   c. By chemical agency, as chlorine gas.
   d. By aeration.
4. Removal of offending gases by specific chemical reactions.
5. Filtration of the offending gases.

The author discusses briefly the odors produced in drinking water by traces of phenol and other coal tar products, especially when chlorine is added to the water; and states that everything possible should be done to prevent coal tar wastes from entering water supplies. A recent Milwaukee Sewerage Commission report states that the activated sludge process of sewage disposal is able to take care of condensation liquor from coal gas plants without decreasing the biological efficiency of the sludge, provided that this liquor does not constitute more than 2 per cent. of the sewage treated. Mention is made of the taste produced in water by synura and similar organisms and of its prevention by storage underground.

The need of dissolved oxygen in waters to oxidize putrescible materials is emphasized. Putrescible industrial wastes are mentioned and the reader is referred to recent United States Public Health Bulletins (Nos. 97, 100, and 109).—H. F. S.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Laurentide Health Service, Grand'Mere, Quebec. *Nation's Health, Jan., 1923, vol. 5, pp. 37-39.*

This is an account of the industrial health service provided for its employees by the Laurentide Company, Limited, a company engaged in the pulp and paper industry. The health service provided includes an industrial hospital, open also to the community, medical and nursing service including district nursing; a water supply system installed for the municipality by the company; co-operation with the municipality in the organization of a board of health with a full-time health officer and laboratory facilities for diagnostic and therapeutic purposes; recreational and educational facilities; a pension plan; an inn, a cafeteria, a dairy, etc.—K. R. D.

Medical Aid in Industry. *Travelers Standard, Dec., 1922, vol. 10, pp. 247-252.*

This is a general article in which are discussed the importance of first-aid and medical service in industry, adequate nursing service, and dental service.

Selling Better Health to N. C. R. Employees. *F. G. Barr. Nation's Health, April, 1923, vol. 5, pp. 227-229.*

The medical force at the National Cash Register Company at Dayton consists of three doctors, one dentist, three nurses, two treatment-room men, one masseuse, and three clerks. An account of the activities of this medical force is herein given, together with the dietetic regimen and the educational propaganda which have been adopted by this company. If the efficacy of an industrial medical department can be judged by the number of calls made voluntarily by employees seeking treatment, then the record of 50,958 calls should signify success. Likewise, an average of 13.5 hours lost per employee because of sickness is evidence much to the credit of this system.—L. A. S.

Industrial Health Becomes Community Health. *H. S. Murat. Nation's Health, April, 1923, vol. 5, pp. 230-232.*

This article gives in brief an account of the health service at Armco, one of the American Rolling Mill Company plants, including a de-

scription of the hospital, the personnel of the medical department, physical examinations, method of keeping records, inspection trips by physicians, housing service, educational work, etc.—L. A. S.

Health Service in Southern Mill. *A. R. Gleason. Hosp. Management, April, 1923, vol. 15, pp. 66, 68.*

The health service of the Standard Knitting Mills of Knoxville, Tennessee, includes a nurse who looks after all first-aid work, makes out reports of accidents for the insurance company, and keeps a card record of treatment, illness, etc., for every employee. The service also includes a superficial physical examination of all upon entrance to employment; and dental service by a dentist who spends four hours daily in the mill, examining and treating patients. A feature which bears upon the health of the employees is the serving of hot coffee to the workers at the lunch hour, at the expense of the company. A table giving a report of four days' work of the first-aid department presents a general idea of the amount and kind of service rendered.—M. C. H.

Summary of Industrial Dental Dispensaries. *Penn. Dept. Labor and Indust., 1922, vol. 1, pp. 40-43.*

The Division of Hygiene and Engineering of the Pennsylvania Department of Labor and Industry made a survey of industrial dental dispensaries in 1921 for the purpose of collecting statistics which would demonstrate the value of industrial dental dispensaries.

Fifty-nine completed questionnaires were received from firms operating in twenty different states and provinces. As some of the questionnaires were completed only in part the resulting data are not presented on the basis of fifty-nine replies to each question, but rather on the basis of the number of replies to the particular question under consideration.

Among the questions reported are the following: number of employees; number of employees using dental service; number of units; number of dentists; cost of original equipment; cost of operating dispensary; division of cost of dispensary; character of treatment given; and success of dispensary. —M. C. S.

INDUSTRIAL NURSING

The Nurse in Industry. *E. Ross. Nation's Health, Jan., 1923, vol. 5, pp. 40-41.*

This is a plea for the recognition by industry as a whole of the fact that the maintenance of health of employees is an efficiency measure, and that the personnel of a department concerned with this maintenance must be responsible to corporation heads only and should stand side by side with all other executive departments, justifying its policies by results. In advocating this recognition of the importance of industrial health service, the author pictures the unbearable situations with which many industrial nurses are faced. —K. R. D.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

An Investigation in a Coal Mine (II). *E. Farmer, S. Adams, and A. Stephenson. Jour. Nat. Inst. Indust. Psychol., Jan., 1923, vol. 1, pp. 173-181.*

The coal miner tends to hang up his lamp in one position, which may be suitable while he is working with the pick at the coal face, but which causes the light to shine directly into his eyes when he turns to shovel coal into a tub. This causes visual after-images. An investigation was made of the character and extent of these images.

A miner's lamp was placed 21 inches from the head of the subject of the investigation, and he was exposed to the light for two seconds. If the light was directly in front, the after-sensations produced lasted, on an average, for eighty-five seconds. If it was 30° or 60° to the right or left they lasted about thirty seconds, and if 90°, 27 seconds. When the glass cylinder of the lamp was made slightly opaque, so that it would cause a dif-

fused light, the duration of the after-images was reduced from forty-eight to twenty-four seconds, and the average number of after-sensations, from 3.4 to 1.7. The intensity of the diffused light was 28 per cent. less than that of the ordinary lamp, but observations on thirty miners showed that their visual acuity was rather better in the diffused light, and they all preferred it to the other light.

One miner, when allowed to use a lamp six times the intensity of the standard lamp, improved his output 15 per cent., and reduced the dirt mined by 22 per cent. After he reverted to the standard lamp, his output fell back 9 per cent., and the dirt increased 48 per cent. The statistical periods in each case lasted eight weeks, and it is suggested that, if the greatly increased weight of the brighter lamp is felt to be an objection, there would not be much handicap in a lamp of double the standard brightness.—H. M. V.

Rag Sorting and Shredding. *Internat. Labour Rev., Feb.-March, 1923, vol. 7, pp. 377-401.*

This article is a useful summary of information gathered by the Industrial Hygiene Service of the International Labour Office regarding rag picking, sorting, and shredding—an occupation in which the majority of those employed are women. The occupation is first described and then information is stated drawn from investigations made in the past in Germany, Austria, Belgium, United States, France, Great Britain, Italy, Netherlands, and Switzerland.

Then follows a summary of legislation in different countries aimed at protecting the workers. Throughout the inquiries made one thread is easily traced: the investigators, impressed by the apparent discomfort of the work and the objectionable condition of much of the material handled, set out on their work expecting to find serious illness and mortality, but in each case the expectation was not fulfilled. Thus, "contrary to expectation, the rag trade does not appear to be a very unhealthy trade. The principal danger is from dust, but 'shoddy fever,' 'flock fever,' and other forms of respiratory disease do not seem to be dangerous illnesses; they apparently resemble mild attacks of chronic influenza. The other danger, that of infection, is greatly reduced by the effects of desiccation on many disease germs."

Precautionary measures advocated include thrashing, disinfection, and dust removal, in the order named. Thrashing can only be done by machinery installed on factory premises; disinfection is best ensured by exposure to steam under pressure; and dust removal in sorting and shredding by downward exhaust drafts, carefully constructed. Dust removal has given excellent results and manufacturers have admitted that had they realized before the advantage to be gained they would have installed the system twenty years ago. Vaccination of workers before engagement and the wearing of special working clothes should be made obligatory.—E. L. C.

The Outer Wear Knit Goods Industry. *New York State Dept. Labor, Special Bull. No. 117, March, 1923, pp. 19.*

As the result of an investigation into the Outer Wear Knit Goods Industry of New York, interesting findings have been published in this pamphlet.

It was found that the workers were of mixed nationalities but that Americans and Jews were in the majority; that 70 per cent. of the workers were women; that the employers were almost without exception small proprietors of Jewish nationality.

Of the entire number of shops investigated, of which there were 118, sixteen gave out home work to be done in tenements. Although the basic hours of labor were short, in most cases being under forty-eight, the amount of overtime was excessive. Six establishments employing women reached sixty hours a week and over, in direct violation of the labor law.

The median basic wage of all 1,624 employees included in the investigation was from $24 to $25; that for men was from $35 to $40, and for women from $21 to $22 per week.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

Welfare Service Builds 30 Trucks. *A. W. Giersbach. Hosp. Management, Feb., 1923, vol. 15, pp. 68-70.*

To those seeking concrete facts rather than

generalities regarding welfare work, this article should prove interesting reading. Written by the safety engineer of the Four Wheel Drive Auto Company, it presents by striking charts and equally striking statistics a record of which any concern might be proud. Hours of lost time due to accidents dropped from 242 yearly per 3,000-hour worker to 19.7 in the period 1917 to 1922. Credit for this is due to the installation of a hospital and safety department. The time thus saved was sufficient for building thirty trucks. Among other improvements in the first year were:

Total compensation saved $7,571.00.

A reduction in wage loss per 3,000-hour worker from $77.56 to $13.58.

A reduction in doctor's bills for the same worker from $5.66 to $2.16.

A reduction in compensation from $9.21 to $2.60 per 3,000-hour worker.

These results have been secured through hard work intelligently applied.

Careful records of all cases, forms for which are given, are kept and a campaign of education is conducted. This begins with a carefully composed letter to the new employee, and continues through articles in the employees' weekly publication. Other ingenious ways of calling attention to accidents are used, such as posting bulletins giving the condition of injured employees from day to day.

With the facts as he has presented them, the writer is justified in his emphatic assertion that such work pays the insurance company, the employer, the employee, and the general public.—G. N. T.

THE MINING INDUSTRY ACT AND WELFARE. *J. W. Graely. Indust. Welfare, 1923, vol. 5.*

"Three principles stand out prominently: (1) the industry is made responsible for the well-being of its members; (2) financial gain is not the only true and satisfactory reward of labour or capital; (3) better understanding and relationship between employers and employees is necessary."

A welfare scheme which is now successfully catering for the needs of a mining community in Lancashire is described. The three great requirements of the mines are said to be (1) pithead baths, (2) educational facilities, and (3) safety and health campaigns.

Methods of dealing with mine accidents are referred to briefly.—E. M. H.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

HEALTH SERVICE IS "CHARITY." *J. A. Lapp. Hosp. Management, March, 1923, vol. 15, pp. 76, 86.*

The courts have generally held that a hospital conducted by an industry for the service of its employees is a charitable enterprise, even when a regular monthly contribution is made by the men. In one case decided by the United States Circuit Court of Appeals (Union Pacific Railway Company *versus* Artist, 60 Fed. 365) the true test of such institutions is held to be whether they are run for a profit. In another case (Richardson *versus* Carlion Hill Coal Company, 10 Wash. 651) the company retained one dollar per month from the wages of employees to help defray hospital expense, but the institution was still held to be a charitable one inasmuch as there was no intention of making a profit. In Eighmy *versus* Union Pacific Railway Company, 93 Iowa 538, the court said: "A railway company voluntarily furnishing a hospital for the treatment of its employes in case of injury is not liable, provided it employs competent surgeons."—G. N. T.

RESTRICTIONS ON THE USE OF LEAD PAINT. *Abstr. from Brisbane Standard, Australia, Sept. 22, 1922, in Internat. Labour Office, Indust. and Labour Information, Jan. 12, 1923, vol. 5, p. 70.*

"In September, 1922, a bill was placed before the Queensland State Parliament to amend the Health Act, particularly in respect to the use of lead paint. The following clause restricts the use of such paint on houses:

"No paint containing more than 5 per cent. of soluble lead shall be used or put within 4 feet from the ground or floor of any residence, hall, school, or other building to

which children under the age of 14 years have access, or any verandah, railing, gate or fence. No surface of paint which contains more than 5 per cent. of soluble lead shall be rubbed down in a dry condition."—M. C. H.

REPORT OF THE COMMITTEE ON MEDICAL QUESTIONS. *New York State Dept. Labor, Special Bull. No. 115, Nov., 1922, pp. 24.*

Out of the experience and information acquired by the committee appointed to investigate questions involved in the medical aspects of the Workmen's Compensation law, came various conclusions relative to existing practices under the law and recommendations for improving the service both as to the workmen and to the medical profession. With a view to stimulating a wider opinion with regard to the law and its administration and to the correction of existing abuses, the report of the committee is published herewith.
—M. C. H.

WORKER'S COMPENSATION. *Internat. Labour Office, Legislative Series, 1922, U. S. A. 2, pp. 11.*

A presentation is given of the Workers' Compensation Act of September, 1916, amended to June, 1922, providing compensation for employees of the United States suffering injuries while in the performance of their duties, and for other purposes. Forty-two various conditions demanding compensation are described.—M. C. H.

COMPENSABLE OCCUPATIONAL DISEASES UNDER FEDERAL EMPLOYEES' COMPENSATION ACT. *U. S. Month. Labor Rev., April, 1923, vol. 16, pp. 823-825.*

The following account is given of the ruling of the Comptroller General in regard to compensable occupational diseases under the Federal Employees' Compensation Act, and of the action taken by Congress as a result of this ruling.

The United States Employees' Compensation Commission since its creation in 1916 has construed the terms of the law which it administers to cover disability from disease as well as from accident. The statute allows compensation for disability or death of an employee "resulting from a personal injury sustained while in the performance of his duty," and this language has been construed to be applicable to diseases found to have a direct causal relationship with the nature of the employment. By a ruling of September 23, 1922, the Comptroller General held that compensation may be paid under the law only for such disability as is the result of a personal injury of an accidental nature, or at least of a personal injury which is referable to some particular event capable of being fixed in point of time.

The matter was held under consideration for a time, and on January 13, 1923, a number of typical cases were submitted as illustrative of the practice of the commission in its construction of the term "personal injury" where disease was found to be causally connected with the employment; the final ruling of the Comptroller General is dated January 29. The cases submitted included those of a rural mail carrier frozen to death some time during the night of February 2, 1917; a T. N. T. worker who died of catarrhal jaundice, as the physician reported, but whose death was found by the commission to be due to poisoning contracted in the line of duty by the gradual inhalation or absorption of poisonous fumes; a painter stricken with cerebral hemorrhage, the diagnosis also indicating chronic interstitial nephritis, and a finding of chronic lead poisoning; a Public Health Service employee engaged in investigating spotted fever, who died of that disease; and a postal employee with the American Expeditionary Force in Siberia, who died of typhus fever, evidently contracted in vermin-infested cars in which he was required to travel. In all, eleven cases were submitted.

Of these, only the death of the mail carrier by freezing was found to have been compensable as due directly to injury, accidental or fortuitous, and occurring within certain definite limits of time. It was impossible to locate definitely the occurrence of the disabling injury in the case of the T. N. T. worker, or of the painter dying of lead poisoning, or of the entomologist contracting spotted fever, etc. They were therefore held not to be covered by the act. The case of the Health Service employee caused some additional discussion, as "the disease was found to have resulted from an accidental infection in line of duty," and the case was "of such character that the exact time of the infection might perhaps be fixed but for the lack of evidence, which alone prevented the exact

day and hour from being determined and reported."

The case therefore puts directly at issue the question whether the term "personal injury" as used in the compensation law contemplates and covers disease resulting from accidental infection in line of duty.

If the intent of the law was to include among personal injuries cases of specific germ infection, it is most improbable that the requirement that the day and hour of the injury be shown would have been placed in the law. Clearly the time of injury was the time of infection and not the time the symptoms developed. There might be cases in which the exact time and means of infection are known, but I think such cases would be the exception and not the rule. Congress can not have meant to discriminate in favor of such cases. Furthermore, as hereinafter shown, the term "personal injury" as used in this law does not cover disease of this character. I must conclude, therefore, that all such cases are entirely outside of the law, and that there is no legal basis for an award of compensation in this case.

As to the postal employee who contracted typhus fever, "there is no contention that the disease was occupational, only that it was caused by insanitary conditions under which he was required to travel officially. The United States Government was in no way responsible for this condition."

The seriousness of this question is indicated by the fact that the last annual report of the compensation commission presented more than 300 cases of injury due to occupational disease as classified by the commission. The ruling of the Comptroller General limiting the statute to "direct injury to bodily tissue through some accidental or fortuitous happening definitely fixed in point of time, in contradistinction to the gradual organic changes or functional disturbances brought about by vocational or other diseases," will affect not only such number of claimants or dependents as were involved in that year, but the total number accumulated during the experience of the act. His opinion concludes:

> In view of the past practice of the commission in awarding and paying compensation in cases of disease as well as of injury, and the practice of the accounting officers of the Treasury in allowing such payments, this office is warranted in recognizing that practice to the extent that all payments heretofore made shall be credited in accounts of the disbursing officer of the commission. I also feel warranted in permitting payments to continue under awards which have already been made for the remainder of the current fiscal year in order that time may be given for readjustment of the several awards, and for congressional action if the law as construed by this office does not carry out the will of Congress at this time. There should be no further awards of compensation in cases similar to those decided adversely herein, and no further payment in any such cases already awarded after June 30, 1923, unless such awards and payments shall hereafter be specifically authorized by law.

To meet the situation resulting from this ruling, an amendment was introduced in the House of Representatives on February 6, proposing to define the term "injury" so as to include, "in addition to injury by accident, any disease proximately caused by the employment."

This passed the House March 1, but the Senate Judiciary Committee felt that the time was too short, before adjournment on March 4, to discuss the principles involved in the amendment; but it "seemed to the committee rather inhumane to deprive of compensation those people who were suffering from these diseases in cases which had been already adjudicated." An amendment was therefore adopted providing that "persons now receiving compensation upon an award made by the Compensation Commission shall, until March 1, 1924, be entitled to receive the amount awarded, unless the award so made shall by the commission be set aside."

This amendment has the effect of extending the period of benefits to March 1, 1924, instead of to June 30, 1923, as provided in the ruling of the Comptroller General, the announced purpose being merely to preserve the present status, "in order to give the next Congress the opportunity to consider whether or not they will adopt the policy" heretofore carried out by the Compensation Commission, or whether the rule of interpretation laid down by the Comptroller General will stand. —R. B. C.

COMPULSORY ACCIDENT INSURANCE OF AGRICULTURAL WORKERS IN ITALY. *U. S. Month. Labor Rev., Jan., 1923, vol. 16, p. 26.*

In 1917 compulsory insurance of agricultural labor against accidents was introduced into Italy. This law places agricultural workers on a par with industrial workers, as far as provision for insurance against work accidents is concerned. Nine million workers are thus affected. In view of this large number of workers to be protected, the extension of

compulsory insurance to work executed without employing machinery was much more necessary in agriculture than in manufacturing industry.—M. C. H.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

ADEQUATE RECORDS OF LOST TIME IN INDUSTRY. *L. R. Thompson and D. K. Brundage. Nation's Health, Feb., 1923, vol. 5, pp. 99-100.*

For a considerable period the United States Public Health Service has urged the keeping of adequate sickness records in private industries. The chief reasons given for this campaign are:

(1) It is believed from a standpoint of business efficiency that absenteeism and its causes, relating as they do to production, have need of close study.

(2) Our present-day knowledge of the dangerousness of individual health hazards is based on mortality statistics. We have but an indefinite idea of either the diseases caused by these hazards or the resulting time lost through disability.

(3) The basis of reasonable standards for the protection of the health of the industrial worker can only be obtained where reliable sickness records indicate the effectiveness of the protective measures.

(4) The efficiency of the factory in minimizing its known health hazards, can only be judged by comparing its sickness records with other plants engaged in the same class of work.

(5) Standardizing the sickness records used by private concerns makes possible accurate comparison, where before, even though the data were most valuable, they were collected in so many different ways as to make comparison impossible.

Interesting results are reported of the analyses of data obtained from monthly reports of sick benefit associations. For example, it was found that the average frequency of cases of sickness and non-industrial accidents causing disability for eight consecutive days or longer among 75,000 industrial employees in 1921, was ninety-eight cases per 1,000 persons, the range being from forty-eight to 349 cases per 1,000 persons—a variation of more than 700 per cent.

Other interesting figures are given which indicate clearly that full reports and careful analysis of industrial morbidity are an intelligent approach to the problem of reducing lost time in industry.—K. R. D.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

VOLUME V AUGUST, 1923 NUMBER 4

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GENERAL

SOME WAYS OF DISPENSING HEALTH EDUCATION. *E. Whitty. Pub. Health Nurse, May, 1923, vol. 15, pp. 241-242.*

The following are suggestive, as ways in which health education can be dispensed to employees of an industrial concern:

1. By co-operation of manager.
2. By bulletin board service.
3. By short health talks.
4. By demonstrations.
5. By pamphlets.
6. By small loan library.
7. By dental clinics.
8. By co-operation with department heads.
9. By inspection and suggestions for correction of health hazards.
10. By co-operation of restaurant managers.—M. C. H.

HEALTH AND THE WORKERS. *R. Sand. Internat. Labour Rev., April, 1923, vol. 7, pp. 507-514.*

The author stresses the importance of health propaganda work in industry and notes the contributions which can be made by the employers, the community, and the workers, respectively. Certain defects in the conduct of such propaganda have often been observable and have retarded the effectiveness of the work attempted; nevertheless, a great deal has been initiated with useful results in many different countries of the world. A number of instances of successful work are described.

Dr. Sand considers that popular health propaganda has entered a new phase and that the participation of the workers in the struggle for health which should result from such propaganda will bring into existence a new element of energy and power.—E. L. C.

THE MUNICIPAL HEALTH OFFICER AND INDUSTRY. *A. H. Flickwir. Texas State Jour. Med., Jan., 1923, vol. 18, pp. 454-456.*

During the past few years, the scope of work done by municipal health departments has broadened greatly. In Houston, Texas,

for example, the city health officer has considered it proper to investigate industrial conditions and recommend health measures that would be of benefit to industry. Large industries, when choosing locations for their plants, naturally favor clean cities, other things being equal; it is of course a part of a health officer's routine work to see that sanitary conditions are good, water supply pure, and housing facilities well supervised. Beyond this, however, the health officer can perform much useful work in co-operation with departments of labor, industrial or accident boards, and safety engineers, particularly with reference to safeguards provided by law for the life, comfort, and health of workmen. He can often convince owners of industrial plants that the employment of full-time physicians or surgeons is a wise measure. In Houston, a woman inspector of industrial hygiene employed by the city health department inspects factories where women or girls are employed, paying especial attention to ventilation, light, toilet facilities, and lunch or rest rooms. This has resulted in greatly improved conditions. The inspection offers a means of detecting and checking communicable diseases. Employers in Houston have acquired the habit of consulting the health department whenever problems concerning the health of their employees arise, and the department has been of material help in several cases. All such work results in a substantial saving to the community which pays the taxes for the support of the health department. The propriety and duty of devoting attention to industrial hygiene are therefore clear.—G. N. T.

HEALTH IN INDUSTRY. *D. B. Armstrong. Current Affairs, April 9, 1923, vol. 13, pp. 3-5, 36.*

In this address before the members of the Boston Chamber of Commerce, Dr. Armstrong makes a strong plea for health work, insisting that it should be undertaken frankly by employers as a profitable thing, and that no philanthropic motives should be claimed where it is introduced. Workmen are keen to discern that welfare work is undertaken as much or more for the employer's welfare as for that of the employee. Properly conducted, its profits are measured by decreased labor unrest, decreased turnover, increased production, decreased loss of time for illness, and other factors. Without adequate trial, and the analysis of well-kept records, employers are not justified in having an opinion against medical service in industry.

Health work applies to all grades of employees. Highly paid executives who neglect their health are guilty of a serious breach of trust. Their duty to the company which employs them calls for efficient service, and ill health may make their services worth only a fraction of what is paid for them. Production managers who employed no master mechanic to keep machinery always at maximum capacity would be severely condemned, but executives who neglect their own machinery more often are the objects of sympathy than of condemnation. Regular medical examination of executives, like that of the Colorado Fuel and Iron Company, is desirable. The field of industrial hygiene includes not only the factory but office rooms and ordinary business houses. It presents special problems in each case, problems that must be studied carefully in order to assure maximum profitable results. Very high temperature, lack of moving air, irritation from industrial disease, all tend to curtail a workman's production. "Slowness, moroseness, lack of co-operation, soldiering, sabotage, and strikes are often a means of expressing the worker's resentment against unpleasant working conditions."

Health work in a given plant should be undertaken only after careful study and in accordance with a well-chosen plan. The industrial physician must be selected with care, for his job demands exceptional qualities. He should:

1. Diminish employment of the unfit.
2. Assign men to suitable jobs.
3. Run a regular clinic service and treat accidents.
4. Study and eliminate unhygienic conditions throughout the plant as to ventilation, light, cleanliness, accident hazards.
5. Diagnose chronic affections and refer them to the patient's own physician for treatment.
6. Promote health education by posters, talks, etc.
7. Provide a special personal service for the executives, a sort of life extension in industry.

8. Examine new employees.
9. Examine old employees periodically.

Much depends upon securing the co-operation of employees. In industries where the work has been conducted intelligently, employers have secured such good results that they would not do without it.—G. N. T.

INDUSTRIAL MEDICINE IN RELATION TO PUBLIC HEALTH. *Canad. Med. Assn. Jour., May, 1923, vol. 13, p. 356.*

The development of the industries of today from the trade guilds of the middle ages has transformed the whole life of civilized nations, and industrial medicine, which deals with the well-being, safety, and human rights of the vast majority of the population, has become one of the most important branches of public health.

The problems of industrial medicine come under three general headings: (1) prevention and control of communicable diseases; (2) the correction of unhygienic conditions of life and work which determine or contribute to premature death; (3) the prevention of occupational diseases and industrial hazards.

It is only in recent years that we have begun to understand and appreciate the underlying conditions affecting the health of industrial workers, such as ventilation, hours of work, fatigue, light, cleanliness, temperature, humidity, etc.; and of the many factors that determine the health and longevity of man, perhaps none is so important as his daily occupation. In some instances the conditions which make an industry hazardous originate in the employers' negligence or ignorance; in others it is in the nature of the industry itself; finally the industrial worker suffers many avoidable accidents and preventable diseases through indifference, carelessness, or lack of knowledge. For both employer and employee the most vital problems of today are in connection with those matters concerned with the health of industrial workers.—M. C. H.

INDUSTRIAL MEDICINE. *B. L. Wyatt. Canad. Med. Assn. Jour., Feb., 1923, vol. 13, pp. 114-117.*

The author of this article, realizing the necessity for the adjustment of the working environment to the worker and the adaptation of the worker to the conditions of employment, has written this article emphasizing the great need of medical teaching and medical practice in industry. He mentions the course in industrial medicine at the Harvard Medical School in which there are ample facilities for training the industrial medical personnel; he enumerates the fundamentals with which the industrial physician must be conversant; he outlines a complete industrial health program; he stresses the function of the safety service, the need of physical examinations, the improvement of plant sanitation, and provision for benefits under the Workmen's Compensation Act. "When the statement is made that industrial health work pays, it must not be assumed that the company is the sole beneficiary. . . . The records of the Laurentide Health Service show substantial monetary return to the company and even larger additional dividends to its employees."—M. C. H.

THE SCIENCE OF HUMAN EFFORT. *R. S. Hutton. Jour. Inst. Metals, 1922, vol. 28, pp. 469-494.*

This paper forms the first annual lecture on subjects of practical interest to those engaged in the non-ferrous metals industry, and is notable as given by an engineer. When dealing with health the effect is noted of the use of mechanical devices and of alteration in method upon the mortality from phthisis among grinders at Solingen in Germany; a mortality in 1885 to 1895 of 12.8 became 7.82 in 1904 to 1905; while illness fell from 38.5 per cent. in 1886 to 1898 to 20.3 per cent. in 1905. At Sheffield also improvement is reported, for whereas out of every 100 deaths among grinders 51.2 per cent. were due to phthisis in 1908 to 1912, only 37.8 per cent. were ascribed to this cause during the period from 1917 to 1921.

There exists a great mass of sickness to attack amounting among fourteen and a half million workers to a full year's labor of 278,000 persons. The author advocates factory canteens on account of the close relation between food and physical effort. Attention to ventilation and temperature is placed first among improvements needed in conditions of work. Scientific methods are required for study of human effort as for study of material objects, in order to perfect vocational selec-

tion, training, fatigue, and time and motion studies. Particular reference is made to Farmer's method of investigating the *easiest* way to work rather than Gilbreth's method of finding the *speediest* way. An example is taken from an inquiry into metal polishing with which the writer was associated; this inquiry has been published elsewhere as Report No. 15 of the Industrial Fatigue Research Board. The value of team work is stressed and evidence in support of this is quoted. The dictum is stated that "a great deal of our present-day misunderstanding in the industrial sphere is due almost as much to ignorance of the aspirations and mentality of the worker by employers, as to the lack of knowledge of basic economic principles of industry and commerce by the workers."—E. L. C.

PROGRESS IN THE HYGIENE OF THE PRINTING TRADE UP TO 1902. *F. L. Hoffman. U. S. Month. Labor Rev., Nov., 1922, vol. 15, 1105-1114.*

In this article conclusions of writers who observed printing conditions of bygone days are noted. Thackrah, in 1832, made a brief reference to the printing trade in his "Effects of Arts, Trades and Professions on Health and Longevity." He stated that letter press printers worked in a confined atmosphere and with little chance to move about. Lead poisoning, weakening of the eyesight, derangement of digestion, and respiratory diseases were the most common afflictions. Hirt, in 1871, found lead poisoning and lung diseases prevalent, and he emphasized the importance of dust. One of the most painstaking observers was Arlidge whose "Hygiene Diseases and Mortality of Occupations," written in 1892, deserves careful study. He tells of a special investigation made in 1862 by Dr. Edward Smith of the Privy Council in London. This investigation revealed a lamentable absence of sanitation, poor ventilation, a condition of prolonged hours of night work, and careless, intemperate habits on the part of many workmen. Arlidge mentions the habit of compositors of placing type in the mouth. He also refers to the dust which accumulates by friction of type in the cases and in other ways as being the cause of serious injury. He mentions lead poisoning briefly, but lays more emphasis on the respiratory diseases and on the occurrence of varicose veins, ulcers, and swelling of the ankles due to continued standing in one place. Arlidge notes a steady improvement in working conditions over a period of years, with a resulting improvement in health. Layet, a French authority, is quoted by him as enumerating the common illnesses among compositors as weakening of the sight, defects of accommodation, chronic inflammation, and blepharitis. Arlidge's own investigations did not confirm the apparent frequency of eyestrain. Van Hosbeck is quoted as believing in a tendency to cerebral congestions and hemorrhage as well as to occasional onset of spasm and in-co-ordination of the fingers from excessive use in minute work. Other reported results are neuralgic pains, deep fissures of the lips, and at times the development of tumors of the mouth seemingly the consequence of "type chewing."

The development of stereotyping and modern printing machines was proceeding rapidly at this time. Lithography is represented as a dangerous occupation only through the use of poisonous colors.

In 1897 the printing industry was included in the decennial review of occupational mortality. The mortality of printers was higher than that of all occupied males by 15 per cent., with phthisis especially prominent. The conclusion of the registrar general was that the principal cause of the high death rate was the excessively unhealthy conditions under which the work was carried on. In spite of this bad showing, mortality of printers had decreased considerably in the preceding twenty years.

In 1900, Dr. Leonard A. Parry published a brief treatise on "The Risks and Dangers of Various Occupations and their Prevention." Lead poisoning due to dust, the chewing of type, and inhaling of fumes was noted and the use of green arsenical pigments by lithographers condemned. In 1902, Sir Thomas Oliver discussed printing in his treatise on "Dangerous Trades," devoting a special section to lead and its compounds. He called attention to the usual dangers. His report illustrates a tendency common to such investigations of laying undue emphasis on poorly equipped shops and giving too little credit to those where health conditions were

good. He makes excellent recommendations, however, for improving conditions where necessary. Typesetting machines with automatic distribution came into general use at this time.

It is suggested that further research would be of value, particularly the study of current morbidity statistics and of employees at work. —G. N. T.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

ACIDOSIS AMONG STOKERS IN TROPICS. *B. Abe et al. Abstr. as follows from Naval Med. Assn. Bull., Tokyo, July, 1922, p. 5, in Jour. Am. Med. Assn., Feb. 10, 1923, vol. 80, p. 443.*

According to Abe, Fukui and Imai, acidosis among stokers may be prevented by administration of 1.0 gm. sodium bicarbonate after two hours' work.—K. R. D.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

FIRST AID AND RESUSCITATION IN GAS ASPHYXIATION. *Am. Gas Assn., New York, 1923, pp. 22.*

This booklet gives in concise form authoritative instructions for resuscitation in cases of gas asphyxiation. General directions for giving the oxygen + carbon dioxide inhalation treatment developed by Henderson and Haggard are also included.

Copies of the booklet may be obtained from Mr. Oscar H. Fogg, American Gas Association, 342 Madison Avenue, New York.—M. C. S.

TREATMENT OF THE ASPHYXIATED BY ARTIFICIAL RESPIRATION AND INHALATIONS OF OXYGEN. *R. Legendre and M. Nicloux. Rev. d' hyg., April, 1923, vol. 45, pp. 305-320.*

After indicating the frequency of asphyxiation due to industrial hazards, to attempted suicide, and to other causes, the authors discuss the Laborde, the Sylvester, and the Schäfer methods of inducing respiration; that of Schäfer is strongly recommended.

It is usually desirable to enrich the inhaled air with oxygen, and it is absolutely necessary to do so in cases of syncope due to poisoning with carbon monoxide. A mask for the administration of oxygen, the invention of the authors, is described in detail, and its use in conjunction with the Schäfer method is illustrated.—W. W.

COLOR OF BLOOD AFTER CARBON MONOXID. *G. Benassi. Abstr. as follows from Biochim. e Terap. Sper., Dec. 31, 1922, vol. 9, p. 357, in Jour. Am. Med. Assn., March 10, 1923, vol. 80, p. 730.*

Benassi admits that although the light red color of blood stains in persons dead from carbon monoxide poisoning is important, yet the absence of the color does not disprove at all the possibility of a great part of the hemoglobin being bound with carbon monoxide.—C. K. D.

HYGIENIC METHODS OF PAINTING: THE DAMP RUBBING DOWN PROCESS. *Jour. Roy. Soc. Arts., Feb., 1923, vol. 71, pp. 240-255.*

This is a very interesting article which deals with the importance of dry sandpapering in the production of lead poisoning among painters. Figures are given showing the amount of lead dust and its distribution when walls are sandpapered. The dust may be inhaled not only during the actual process, but later from the dirty clothing. Sandpapering on wet days results in but little dust. The dust from this process contains particles of silicon, which may explain the

high rate of respiratory disease in painters.

All of the dangers from this process may be obviated by moistening the surface of the wall and using a waterproof sandpaper. This is now manufactured successfully in America, and gives very satisfactory results without the production of any deleterious dust. The abandonment of dry processes for rubbing down is very desirable in respect to all paints.—J. C. A.

LEAD POISONING IN THE MANUFACTURE OF CERAMIC TRANSFER PICTURES IN GERMANY. *U. S. Month. Labor Rev., April, 1923, vol. 16, pp. 129-130.*

Transfer papers used in impressing patterns on pottery are made with lead colors, and the process of manufacture causes workmen to be exposed to considerable quantities of lead dust. The German Ministry of Labor has recently issued regulations for the protection of the workers. Briefly, these regulations indicate the following necessities:

1. Workrooms large enough to provide 25 cubic meters of space for each worker, separated from other workrooms, and with smooth walls and floors.
2. Wherever possible, hoods, equipped with suction devices, and when not possible, suitable protectors for the nose and mouth.
3. Suitable provision for washing, bathing, and change of clothing.
4. Washable working clothes, drinking glasses, towel and brush for cleaning nails.
5. No eating or drinking in workrooms, or in any place before washing and removing dust from the person.
6. Physical examination of workmen on entrance, and distribution of safety literature.
7. Regular inspections by physicians at least every three months; exclusion of those proved susceptible to lead poisoning, with treatment of other cases; permanent detailed records of physical condition of workmen, and changes in personnel.—G. N. T.

A REPORT OF THE STUDY OF THE EFFECTS OF LEAD ON PRINTERS, CARRIED OUT BY THE INSTITUTE FOR INDUSTRIAL HYGIENE AT FRANKFURT. *L. Schwarz. München. med. Wchnschr., April 27, 1923, vol. 70, p. 535.*

The author presents figures from a study of large numbers of individuals connected with the printing industry in various German cities. The interrelations of such symptoms as anemia, stippling of erythrocytes, and increased hematoporphyrin in the urine, are studied. Very little parallelism is found between the number of cases showing increased hematoporphyrin in the urine and those presenting abnormal blood pictures.

The author points out that so many causes may bring about pallor, colic, constipation, etc., that these common early diagnostic signs of lead poisoning are often erroneous. Periodic examination of the blood and urine of printers is advised; whenever there is a suggestion of effects due to lead, a change of occupation may prevent more serious trouble. —A. S. M.

COMPARATIVE TOXICITY OF INORGANIC LEAD COMPOUNDS AND METALLIC LEAD FOR PIGEONS. *P. J. Hanzlik and E. Presho. Jour. Pharmacol. and Exper. Therap., March, 1923, vol. 21, pp. 123-129.*

The author studied the toxicity of inorganic salts of lead because the chloride and the sulphide are formed in the body and the iodide may be formed during treatment by potassium iodide. Whether given in single or daily doses, the inorganic lead salts used (chloride, iodide, sulphide, carbonate, and acetate) were less toxic than metallic lead for pigeons under similar conditions of experimentation.—J. C. A.

THERAPEUTIC EFFICIENCY OF VARIOUS AGENTS FOR CHRONIC POISONING BY METALLIC LEAD IN PIGEONS. *P. J. Hanzlik and E. Presho. Jour. Pharmacol. and Exper. Therap., March, 1923, vol. 21, pp. 131-143.*

Metallic lead in the form of shot was administered by mouth to adult pigeons. The doses corresponded to the upper limits of fatal dosage for the majority of pigeons. The therapeutic agents were mixed with the food in daily doses which corresponded to the maximum therapeutic dosage for man.

"1. Using the following criteria: mortality, maximal loss of body weight and its time of appearance, the first appearance of loss of body weight, time of recovery, and daily food consumption, the therapeutic efficiency of some agents in current use for the treatment of chronic lead poisoning was tested.

"2. Using sodium chloride as control, the daily administration of sodium iodide in food

and drinking water, and of magnesium sulphate and calcium sulphide in food . . . was found to be beneficial.

"3. This agrees generally with the clinical results obtained with these agents in the treatment of chronic lead poisoning in man.

"4. The mechanism of action of sodium iodide and calcium sulphide is not settled. The beneficial effects of magnesium sulphate are due to its cathartic action, in part, at least.

"5. The insolubility of metallic lead in 0.2 per cent. hydrochloric acid and in 0.2 per cent. hydrochloric acid and pigeon food *in vitro* at body temperature (conditions analogous to those in the gizzard) is markedly reduced by sodium iodide, magnesium sulphate, and calcium sulphide.

"6. Therefore, the beneficial therapeutic effects of these agents in the lead poisoning of pigeons are attributed partly to the diminished solubility of the lead, and, therefore, diminished absorption."—J. C. A.

COMPARATIVE TOXICITY OF METALLIC LEAD AND OTHER HEAVY METALS FOR PIGEONS. *P. J. Hanzlik and E. Presho. Jour. Pharmacol. and Exper. Therap., March, 1923, vol. 21, pp. 145-150.*

The author concludes as follows:

1. The following heavy metals administered to forty-two pigeons up to four times the fatal dose of metallic lead for the majority of pigeons previously reported were variably and moderately toxic, namely, aluminum, antimony, bismuth, cadmium, copper, iron, manganese, mercury, nickel, silver, tin and zinc. Out of the entire lot of forty-two pigeons used only one pigeon died, namely, one that received a medium dose of metallic tin.

2. Therefore, metallic lead is more toxic, and plumbism is more or less a specific toxicity in the sense that characteristic symptoms occur rather promptly, and mortality is higher with smaller doses than with other heavy metals.—J. C. A.

ZINC POISONING. *London Letter. Jour. Am. Med. Assn., March 10, 1923, vol. 80, pp. 707-708.*

An outbreak of zinc poisoning is rare. One occurring recently among the inmates of an institution near London makes evident the danger that may arise from the use of galvanized iron vessels in cooking. About 400 persons were served at tea with hot stewed apples. Within a few minutes, more than half of them complained of dizziness, nausea or sickness, and tightness in the throat. There were also some cases of diarrhea. The medical officer at once administered a bismuth and chalk mixture, and within a short time most of the sufferers recovered. Only ten were seriously ill, and all were sufficiently well next day to carry on their ordinary work. The apples had been freshly gathered, and stewed in large galvanized iron "skeps," which were placed in iron steamers. The skeps were used because on a previous occasion the apples had turned black when placed directly in the steamer. Analysis of some of the apples showed that they contained 7 grains of zinc, in the form of zinc oxide, in a pound. This is equivalent to 20 grains of hydrated zinc sulphate to a pound. The dose given in the British pharmacopeia is from 1 to 3 grains (0.065 to 0.195 gm.), and the emetic dose, from 10 to 30 grains (0.65 to 1.95 gm.). Each person who ate the stew may be assumed to have taken about 20 grains (1.3 gm.) of the sulphate. Its presence in the apples can be explained by the solvent action of vegetable acids on zinc. Hence, galvanized iron vessels are not sold for cooking, and in private houses never appear to be used for this purpose. But managers of public institutions seem to require instruction as to the risk.—K. R. D.

DUST HAZARDS AND THEIR EFFECTS

METHODS AND APPARATUS FOR THE DETERMINATION OF DUST SUSPENDED IN AIR. *P. H. Warren and T. A. Read. Proc. Australian Inst. Min. and Met., New Series, 1922, No. 47, p. 297.*

The general aspects of the problem are first discussed with extensive citations from the work of the Miners' Phthisis Prevention Committee, South Africa, and the United States Bureau of Mines. The importance of

the size of the particles to be determined is emphasized. Kotzé's konimeter is described and criticized with special regard to its efficiency and the practical difficulties in its operation.

With the sugar tube the writers propose using the Kotzé pump (operating on the ejector principle) in place of a hand-operated pump. The Crowell motor-driven pump is also described.

A new apparatus for determining dust, the Read Water-Spray, is described in detail. In principle it is an adaptation of a commercial scrubber and depends on the humidification produced by the atomization of a stream of water drawn up by the force of the air suction through the apparatus. Dusty air enters a tube at the bottom of a round-bottomed brass or glass cylindrical vessel (capped at the top), and, by the force of the velocity pressure, draws up a stream of water through a tube placed beside the air entrance tube. A baffle plate above these two tubes improves the contact scrubbing surface, while a device is included to obviate loss of dusty water by entrainment.

In field tests the new apparatus compared favorably with a sugar tube and an electrostatic precipitator. In laboratory calibrations an efficiency of 95 per cent. was attained.

In the authors' laboratory work one is impressed by the fact that no mention is made of the size of the particles entering the apparatus while in the careful review which precedes the description they lay great emphasis on the significance, from the physiological standpoint in particular, of particle size. In the writer's opinion the authors' laboratory test is by no means as severe as that used by the Bureau of Mines, whose figures on the efficiency of the sugar tube filter are cited by the authors as a basis for comparison with the 95 per cent. efficiency which they obtained with silica dust. From the principle on which the new apparatus operates it seems that the size and character of the particles would have an important effect on the readiness with which the particles could be wetted.

It is surprising that electrostatic precipitation is rated at only 82.7 per cent. efficient. The figure is taken from Bill (THIS JOUR., 1919-1920, *1*, 323) and no mention is made of the mass of industrial data published by others, or of the laboratory work of Tolman, Reyerson, Brooks and Smyth (*Jour. Am. Chem. Soc.*, 1919, *41*, 587); Lamb, Wendt and Wilson (*Trans. Am. Electrochem. Soc.*, 1919, *35*, 357); and Shibusawa and Niwa (*Jour. Am. Inst. Elec. Eng.*, 1920, *39*, 890), all of which show that efficiencies of 95 to 100 per cent. can be obtained with such substances as smoke, ammonium chloride fume, and dust. —P. D.

THE INHALATION OF COAL DUST, ANTHRACOSIS. *Hygeia, June, 1923, vol. 1, p. 183.*

This short article merely presents the danger of permanent injury to the coal miner through the inhalation of coal dust mixed with sand, and states that with improved ventilation of coal mines, controlled by fans, this danger is diminished.—M. C. H.

HEALTH PROTECTION AGAINST DUST AND FUMES. *R. C. Williams. Nat. Safety News, May, 1923, vol. 7, pp. 13-15.*

Dust and fumes occupy an important place among the health hazards of industry. It is estimated that in the United States nearly 4,000,000 workers are exposed to the dust hazard. Realizing the great importance of dust as an industrial health hazard, the United States Public Health Service has begun a comprehensive study of the dust problem in its relation to the effect upon the human body and to the causation of disease. This investigation is to include (1) a study to determine the best methods of collecting dust of the various classes; (2) a study from post-mortem examinations to determine the measurements of the dangerous particles in the various classes of dusts; (3) a study to determine specific standards and distinctions for the different classes of dusts; (4) morbidity and mortality studies to determine the relative harmfulness for the different classes of dust.—R. M. T.

COAL-DUST EXPLOSION TESTS. *U. S. Month. Labor Rev., Feb., 1923, vol. 16, pp. 225-228.*

A report has recently been published by the Bureau of Mines giving results of a series of tests of coal dust explosions, conducted in an experimental mine near Pittsburgh during the years 1913 to 1918. The object was

to make large scale explosion tests under actual mine conditions, and in sufficient number to obtain fairly complete information on the starting, propagation, limitation, and prevention of coal dust explosions.

Coal dust is unavoidably formed in mines during drilling, machine cutting, blasting, and hand picking. Factors which produce a great deal of avoidable dust are overloaded cars and cars having spaces through which coal can fall, as well as the practice of using coal for ballasting in the entries where it is soon pulverized by the feet of men, horses, and mules. The dust will not explode unless ignited in the air, and not even then if it is pure anthracite. Dry sub-bituminous dust is highly explosive.

Besides the exercise of care in preventing the production of dust, there are two safety measures. One consists in wetting the dust. This wetting fails to touch the dust on the timbers, and some of the most disastrous explosions in the country have taken place in mines considered well equipped with sprinklers, force tank cars, and other humidifying methods. It is of considerable effect, however, where thoroughly done. Another method of prevention is through the use of rock dust. Although it has been little used in this country, experiments show it to be effective, and investigations by British commissions have proved that pulverized shale is not injurious to miners' lungs. Shale dust must be used in an amount at least equal to the amount of coal dust and preferably on top of it. The air waves advancing before an explosion automatically mix the two, the rock dust absorbing heat and separating individual particles of coal by a screen of incombustible dust.—G. N. T.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

Chronic Infectious Arthritis. *R. A. Kinsella. Jour. Am. Med. Assn., March 10, 1923, vol. 80, pp. 671-674.*

The author has examined 400 case records in the Barnes Hospital, St. Louis, "for the purpose of inquiring into the classification of chronic infectious arthritis, the validity of the idea of focal infection as a cause, and the results of the usual nonspecific 'shock' therapy." He makes the following comments in concluding:

The most significant features of this study have been:

1. The emphasis given to the part which circulatory changes and consequent nutritional changes play in the production of painful stiffening of the joints in which simple atrophy is the only evidence on roentgen-ray examination.

2. The importance of exhaustive physical examination in the search for infected foci.

3. The necessity of employing many forms of treatment, since no form was constantly successful and each kind of treatment was occasionally successful.

4. The importance of the last described group of male patients whose chief symptom is backache and who have spinal ostearthritis, apparently associated with prostatic infection.

5. The lack of evidence that arthritis deformans is a focal infection.—C. K. D.

The Treatment of Anthrax Infections. *A. McGlannan. Ann. Surg., March, 1923, vol. 77, pp. 263-266.*

Anthrax occurs among workers in hair or bristles and less often among those whose occupation brings them in contact with living or dead animals. The disease is rather common among animals, except in those countries where special precautions are taken against it. Infection reaches man by way of highly resistant spores which contaminate the crude hides and hair of commerce as well as the carcasses of animals dead from the disease. The usual portal of entry in human beings is through an injury to the epidermis, although in woolsorters' disease the infection takes place by inhalation of the bacteria. There is also an intestinal type probably due to contamination of food from dirty hands.

After entering the body there is a period of incubation varying in length from a few hours to three days. Then comes local burning or itching and the development of a papule having a bluish-green center. This soon becomes vesiculated; the contents of the vesicle are hemorrhagic or serous. The vesicle breaks down and forms an erosion in which a purplish-black area of leathery necrosis is set into the papule and separated from the red indurated rim of the lesion. The anthrax papule and pustule are relatively painless, a feature which distinguishes them from furuncle and carbuncle. In man anthrax may remain localized or edema may develop about the pustule and spread rapidly. The lymphatic vessels may become inflamed and the draining lymph nodes swollen and indurated.

Treatment is largely determined by whether or not the disease is localized. If there is a recognizable period in which the bacteria are confined at the point of inoculation, complete excision of the primary focus during this period is the surest and most rapid method of preventing general infection. If the bacteria spread through the circulation at the moment of inoculation, systemic treatment by specific serum injection is the proper method. Eichhorn, of the United States Bureau of Animal Industry, has developed a serum of great potency.

Six case reports are given, in all of which the disease was treated successfully.—G. N. T.

A Suggested New Method for the Disinfection of Hides and Skins for Anthrax. *H. F. Smyth and E. F. Pike. Am. Jour. Hyg., May, 1923, vol. 3, pp. 224-237.*

This is a report on an investigation made in the Laboratory of Hygiene at the University of Pennsylvania, under the authorization of the Pennsylvania State Department of Labor. A survey of the tanning industry in the state had demonstrated that existing methods of disinfection of hides and skins for anthrax were unreliable, harmful to the skins, too time-consuming, or too expensive. Four present methods of disinfection are noted:

1. A twelve-hour soak in a suspension of 15 pounds of burnt lime, or of hydrated lime, per 100 gallons of water;

2. A twenty-four-hour soak in 1-1000 mercuric chloride;

3. A twenty-four-hour soak in 3 per cent. hydrochloric acid in 10 per cent. sodium chloride solution;

4. A twenty-four-hour soak in 1 per cent. formic acid in 1-1000 mercuric chloride solution.

The purpose of the investigation was threefold: (1) if possible to find a satisfactory method of disinfecting skins in the original bale; (2) failing in this, to devise a satisfactory method of disinfecting loosely piled dry skins and hides; and (3) to devise a more satisfactory and reliable method of disinfecting skins in the tannery.

The compounds or elements tried were chlorine, bromine, iodine, hydrochloric acid, phosgene, carbon tetrachloride, trichlorethylene, sulphur dioxide, and ammonia. A series of gaseous disinfectants was tested out first by exposing asbestos wicks or silk threads covered with anthrax spores to the vapors liberated into bell jars containing moist air, at reduced pressure. Varying conditions of pressure, temperature, and time were then tried. Iodine was proved to be the most satisfactory agent for sterilization. Subsequent experiments on skin fragments and whole skins confirmed this. Two methods of application were devised: (1) a vapor disinfection, and (2) a liquid disinfection employing either an aqueous solution of iodine, or a carbon tetrachloride, or carbon tetrachloride-gasoline, solution of iodine.

The vapor disinfection was carried out in a gassing chamber, where proper conditions of temperature and pressure could be had. The liquid disinfections were carried out in the ordinary tannery tumbler. The iodine stain could be removed from the skins by immersing them in a solution of sodium thiosulphate. The method of using carbon tetrachloride or carbon tetrachloride-gasoline solution of iodine was found to be a practical means of dry disinfection in bulk, the solvent being quickly removed by a current of warm air. This method also used up the least iodine, an item to be considered in reducing expense. Altogether the results of the experiments proved that iodine is thoroughly efficient as a disinfectant for anthrax, and can be used without the slightest injury to the hides.—G. N. T.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

EYESIGHT CONSERVATION GAINS FAVOR. *Safety Engin., April, 1923, vol. 45, pp. 113-115.*

Defective vision as a source of industrial waste was revealed by the Hoover Committee on Elimination of Waste in Industry. As a result of the publication of the waste report, individual industries are adopting eye conservation methods to promote efficiency among their workers.

The National Committee for the Prevention of Blindness published in 1917 Bulletin No. 12, "Eye Hazards in Industrial Occupations," which they now hope to revise. The revision will contain the material of the foregoing bulletin arranged, insofar as it concerns the protection of the eyes of the industrial workers, in accordance with the classification set up in the "National Safety Code for the Protection of the Heads and Eyes of Industrial Workers," published by the Bureau of Standards. In addition the revised bulletin will contain chapters on illumination, correction of defective vision, and eye diseases, as far as these topics pertain to the protection of vision in industry. A tentative outline for the proposed revision is given.—R. M. T.

MINERS' NYSTAGMUS. *Hygeia, June, 1923, vol. 1, pp. 183-184.*

A description is given of miners' nystagmus which is characterized by involuntary uncontrollable rolling movement of the eyeballs, accompanied by dizziness and unsteadiness in gait and inability to see clearly. The cause of the disease, it is claimed, is imperfect lighting of coal mines. According to the English Workmen's Compensation Act, nystagmus is a disease for which the employers are liable. The annual expense in England, due to nystagmus, is given as at least one million pounds.—M. C. H.

COMPUTATION OF PARTIAL LOSS OF VISION. *W. Mchl. Nation's Health, April, 1923, vol. 5, pp. 233-236.*

The author deplores the bewildering variety of schemes for measuring and estimating impairments of vision as a result of industrial accidents. He discusses at some length ophthalmological rating of diminished industrial vision and, in an effort to meet the "requirements of justice, common sense and simplicity," suggests the following rating table of his own:

20/25ths	6¼ per cent.
20/30ths	12½ per cent.
20/35ths	18¾ per cent.
20/40ths	25 per cent.
20/45ths	31¼ per cent.
20/50ths	37½ per cent.
20/55ths	43¾ per cent.
20/60ths	50 per cent.
20/65ths	56¼ per cent.
20/70ths	62½ per cent.
20/75ths	68¾ per cent.
20/80ths	75 per cent.
20/85ths	81¼ per cent.
20/90ths	87½ per cent.
20/95ths	93¾ per cent.
20/100ths	100 per cent.

—K. R. D.

AIRPLANE DEAFNESS AND ITS PREVENTION. *V. T. Scott. Mil. Surgeon, March, 1923, vol. 52, pp. 300-301.*

Airplane deafness is that form of temporary deafness caused by the explosions of an airplane motor. It occurs when flights are of one hour duration or longer, and lasts from one to several hours, depending upon the length of the flight. Industrial hygiene warns of deafness in those associated with loud noises.

The comparative shortness of exposure to the motor explosions and the partial protection afforded the auditory apparatus by the helmet are the two factors which make airplane deafness a temporary condition. That atmospheric pressure is not a factor in producing airplane deafness is demonstrated daily at the School of Aviation Medicine, Mitchel Field, Long Island, New York, where there is a "low pressure chamber" in which the barometric pressure can be lowered from 760 mm. (sea level) to 140 mm. (equivalent to 35,000 feet above sea level). No case of deafness has ever been experienced by any man "going up" in this chamber, although neither a hat nor a helmet is worn.

The simplest, safest, and most practical way of preventing airplane deafness is to fasten two ordinary powder puffs to the inside of the ear flaps of the helmet, taking care that the puffs fit snugly over the ears. The hel-

met should be very close fitting in order to prevent dust and wind from entering, and also in order to lessen the noise.

The use of hard rubber, paraffin, and cotton plugs to protect the ears should be discontinued. They have a tendency to irritate the auditory canal; they are also insanitary and, on account of their size, are often hard to find when needed. The powder puffs in the helmet can be removed and cleansed easily; they cannot irritate the auditory canal; and they block the loud explosions of the motor, but allow sufficient noise through to detect a missing motor. The powder puff of wool or a mixture of wool and cotton is more desirable than a cotton puff, as the wool fibers stand out and remain soft and fluffy.—G. N. T.

INDUSTRIAL SURGERY

THE DIAGNOSIS OF CONDITIONS CAUSING BACKACHE. *G. F. Straub. Jour. Am. Med. Assn., March 10, 1923, vol. 80, pp. 674-678.*

In a rather general article the author emphasizes the varied causes of backache and the need for very thorough examination in making a diagnosis. He provides a somewhat elaborate routine scheme covering all possible causes and feels that this can be covered rapidly when the physician gains experience in attacking the problems presented by these cases. His conclusions are as follows:

1. The essentials for an etiologic diagnosis in cases of backache are system and thoroughness in examination.

2. The search for remote causes and for those of local character os fo equal if not greater importance.

3. Congenital anomalies of the lumbosacral region predispose to injury, with subsequent backache.

4. Lumbago proper or lumbosacro-iliac myalgia is one of the most frequent and least recognized conditions.

5. In every difficult case, the establishment of a diagnosis depends on close cooperation of the various diagnostic branches of medicine.—C. K. D.

OCCUPATIONAL TENDON SHEATH INFLAMMATION. *E. Sattler. Abstr. as follows from Arch. f. klin. Chir., March 15, 1923, vol. 123, p. 259, in Jour. Am. Med. Assn., May 12, 1923, vol. 80, p. 1420.*

Sattler describes a large variety of synovial disturbances liable to develop from occupational strain. The affection is observed in locksmiths, joiners, and brakemen, in women who do much pressing or rubbing, and in children learning to write. He gives details of four clinical cases. Even a history of syphilis and positive Wassermann reaction do not stamp the affection as of syphilitic origin; in one such case the lack of benefit from antisyphilitic treatment finally cleared up the case. Then treatment was begun according to Calot's methods: The fluid was released by puncture, and a solution injected of guaiacol, 2 parts; creosote, 8; iodoform, 20; ether, 65; and oil of sweet almonds, 100 parts. In one case the fluctuating swelling over the metatarsophalangeal bursa in the young woman had recurred at intervals during two years. The diagnosis of hygroma bursae hallucis is generally made in such cases, and resection is advised; this leaves cicatricial changes which are often the cause of disturbances. After two or three days of rest for the foot, Sattler merely punctured and injected 1 c.c. of the Calot solution, and the cure was prompt and permanent, without cicatricial tissue.—K. R. D.

THE CARE OF THE INJURED MINER. *R. R. Sayers. Nation's Health, May, 1923, vol. 5, pp. 293-294.*

The care of the injured miner is summarized by the author as follows:

1. Prevention and elimination of accidents and health hazards by study of statistics, investigations of accidents and conditions, education, and legislation.

2. First-aid care. The principles of first aid are asepsis in caring for open wounds; control of hemorrhage by pressure and position of injured part; treatment of shock by keeping patient at rest and warm, and by giving simple stimulants; artificial respiration in asphyxia, electric shock, etc., combined with use of pure oxygen in carbon

monoxide cases; asepsis in treatment of burns; protection from air if this can be done with aseptic method; antisepsis and some relief of pain by use of picric acid gauze; immobilization of dislocations and fractures; transportation by methods which will not increase the extent of injury.

In addition to the benefits gained by early care of the injured, first aid has been found to tend to lower accidents by making men more careful.—K. R. D.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Further Observations on a Cardiovascular Physical Fitness Test. *E. C. Schneider. Mil. Surgeon, Jan., 1923, vol. 52, pp. 18-27.*

This is essentially a reassertion of Schneider's test as previously described in the *Journal of the American Medical Association,* 1920, vol. 74, 1507-1510, and reviewed in This Journal, 1920-1921, vol. 2, 89.—C. K. D.

Sweating from Standpoint of Loss of Energy. *M. E. Bircher. Abstr. as follows from Schweiz. med. Wchnschr., Dec. 30, 1922, vol. 52, p. 1265, in Jour. Am. Med. Assn., March 10, 1923, vol. 80, p. 729.*

Bircher produced sweating in twenty persons by heat and light. The oxygen consumption increased 13 per cent. over the basal rate, and the temperature of the body about 1°C. The increased metabolism lasted longer than the sweating.—C. K. D.

Fatigue as a Factor in Causing Disease as Well as Social and Economic Loss. *L. I. Harris. N. Y. City Dept. Health, Month. Bull., Jan., 1923, vol. 10, pp. 7-10.*

Fatigue caused by excessive physical exertion, by exposure to extremes of temperature, or by prolonged periods of physical or mental labor, plays a very great rôle in straining the reserve capacity of the muscles of normal as well as of abnormal hearts. What is true of the heart is true in large measure of the kidneys, the arteries, and the nervous and digestive systems. Unnecessary or premature breakdown due to fatigue causes the loss of skilful labor and creates a drain upon the efficiency, productiveness, and success of industry. To a considerable degree, fatigue and the consequent physical and mental strains of industrial service contributed to the 5,143 deaths from pulmonary tuberculosis, the 4,105 deaths from Bright's disease, and the 12,005 deaths from heart disease that occurred in New York City in 1921.

Managers of industry should demand that industrial physicians be competent to serve as detectors of conditions of work which may predispose to injury or disease, such as poisonous gases, vapors or fumes, defective ventilation or lighting, faulty posture, monotonous occupation, or physical or mental strain. Working conditions that tend to overtax the mental, nervous, or physical capacity of individuals inevitably destroy intellectual capacity, skill, inventiveness, and initiative. Such qualities must be improved if industry is to achieve as high a degree of efficiency as possible. Discontent is also in a measure a conscious or unconscious response on the part of the worker to the subtle mental or physical poisons of fatigue.

The community must suffer if large masses of individuals have their energies, initiative, and mental powers handicapped by fatigue. Exhausted workers are likely to prove negligent fathers and poor citizens.—G. N. T.

An Examination of Certain Proposed Tests for Fatigue. *F. S. Lee and J. D. Van Buskirk. Abstr. as follows from Am. Jour. Physiol., 1923, vol. 63, p. 185, in Med. Science, June, 1923, vol. 8, p. 254.*

The authors have examined experimentally a number of physical tests which have been proposed or might conceivably be employed as indicators of fatigue in human beings. Among the tests examined are those of Crampton, Schneider, Flack, Ryan, and Martin. None of the tests examined afford a reliable criterion of the daily physical fatigue of the individual resulting from such physical exertion as a walk of 14 miles. Several of

the tests (the Crampton and Schneider tests) have demonstrated their value in the detection of pronounced physical deterioration amounting often to a pathological condition, or of fatigue in masses; but none of the tests appear to be practicable in the detection or measurement of the physical fatigue resulting from the day's work of the individual.—M. C. S.

AN EXPERIMENT ON CHANGE OF WORK. *G. H. Miles and O. Skilbeck. Jour. Nat. Inst. Indust. Psychol., April, 1923, vol. 1, pp. 236-239.*

The authors found that the hourly output of a group of ten girls showed a rapid rise during the first three hours of the morning spell of work, and fell off in the last hour, while that observed in the afternoon spell varied in somewhat similar fashion. It was decided to introduce fifteen-minute "change" periods at approximately the times when the fatigue effect showed itself, and during these periods to put the girls on work of a different character. They were, in fact, employed in fetching from the store the material needed for their work. They thereby saved time which was previously expended for this purpose during the course of their work. In consequence of the adoption of this system, the output of the girls did not fall off during the latter portion of the spells, and their daily output increased 14 per cent.—H. M. V.

WOMEN AND CHILDREN IN INDUSTRY

THE QUESTION OF THE ABOLITION OF NIGHT WORK IN THE COTTON SPINNING INDUSTRY. *Internat. Labour Office, Indust. and Labour Information, Feb. 16, 1923, vol. 5, pp. 317-318.*

The question of the prohibition of night work in the cotton spinning industry is attracting a great deal of attention in Japan, owing partly to the fact that the government is contemplating the amendment of the existing Factory Act with the object of prohibiting the employment of women and young persons during the night.

The present Factory Act, which came into force in 1916, prohibits the employment of women and young persons under 15 years of age from 10 P.M. to 4 A.M., but allows an exception, for a period of fifteen years from the date of the enforcement of the Act, in the case of workers employed on the shift system. It is assumed that the government intends amending the Factory Act to shorten the remaining period of eight years during which night work is still permitted.—M. C. H.

HEALTH OF NEW BEDFORD CHILD LABORERS. *H. G. Rowell. Nation's Health, April, 1923, vol. 5, pp. 225-227.*

Children of New Bedford between the ages of 14 and 16 years are restricted by law to certain tasks which are considered safe for the physically normal person. An attempt is made to build up the health and care for it from the first entrance into school. Each child that goes to work is given a thorough examination and passed for a particular kind of work only. Each change of work means reexamination. During these two years adequate watch of the child's health is kept through the continuation school health work under the same direction as in the general school system.—L. A. S.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

10,500 TREATMENTS IN TWELVE MONTHS. *W. F. Sterne. Hosp. Management, May, 1923, vol. 15, pp. 66-68, 70.*

Dr. Sterne describes the Elmwood Group First-Aid Hospital of the American Radiator Company in Buffalo, and outlines the system under which it is operated.

As the bulk of the work done in these plants is foundry or machine work, the injuries consist chiefly of small lacerations, cuts, infec-

tions, contusions and fractures from the handling and piling of material, and burns (generally of the feet) from hot sand or molten metal. With the modern and improved methods of handling molten metal, however, severe burns are comparatively rare. The large number of annual treatments (10,500) is accounted for by the fact that no matter how slight the injury the employee must be sent to the first-aid room.

The first floor of the building is devoted to the offices of the employment department and the physical examination rooms. This arrangement makes it possible for applicants for employment to be examined readily.

There is a ramp leading to the second floor where all treatments are given. This construction was chosen in preference to stairs or an elevator because it affords easier access to the first-aid room for men carrying a stretcher. Among the rooms on the second floor are the dispensary, dentist's office and special treatment and cot room, physician's office and X-ray rooms, and nurses' and women's rest room. In the special treatment room is a special type of plunge bath having an automatic anti-scald device. This is used for reducing temperatures in cases of prostration, etc.

Both the physician and the dentist are employed full time by the company, but their time is divided between the Elmwood Group Hospital and the five other company plants in Buffalo. Each plant or group of plants has its own nurse and also a visiting nurse.

In each first-aid case a careful record is kept in the medical department and a check is made on this through the use of another card called the foreman's report of the accident. This foreman's report was instituted for several reasons. Many of the employees are of foreign birth or extraction and it is often difficult for the nurse who is recording the data to understand the injured man's explanation. Owing to the nurse's lack of technical knowledge or to the ignorance of the man himself, it is also difficult to get at the technical points. Moreover, by requiring a report from the foreman, it is possible to make sure that no employee who is not injured in the plant can claim compensation. The foreman's card is also invaluable to the safety department as a means of discovering particular hazards. If a man is unable to find his foreman at once or is severely injured, he reports directly to the first-aid room. After he has been treated there, he is given a card to be filled out by his foreman and to be returned to the recording nurse.

Relative to the safety movement in industry, the author states that, in his belief, it should be about 75 per cent. psychological and 25 per cent. physical—that is, 75 per cent. of the work should be carried on through the medium of organized safety committees and assemblies of foremen and the plant's personnel, bulletins, rule books, warning signs, etc.; and the other 25 per cent. through such measures as the correction of manufacturing methods, provision of proper light, and physical examinations.—M. C. S.

CORPORATION CARE OF TUBERCULOUS EMPLOYEES. *R. A. Peers. Am. Rev. Tuberc., April, 1923, vol. 7, pp. 133-140.*

This is an outline of the plan adopted by the Standard Oil Company at Colfax, California, for the care of its tuberculous employees. In the opinion of the author, the two most important factors in the cure of tuberculosis are rest and time, which in turn mean financial assistance. The high percentage of arrested cases which have been under the care of the Colfax institution may be attributed to the fact that each patient knows when he enters that his hospitalization and his family will be financed as long as he is out of work, and that when he leaves the institution his activities will be regulated by Company officials until his ability as a producer is fully restored.—L. A. S.

INDUSTRIAL NURSING

EMPLOYE CONFIDENCE SPELLS SUCCESS. *A. B. Obenchain. Hosp. Management, April, 1923, vol. 15, pp. 68, 70, 72.*

One of the most important although difficult tasks for the industrial nurse to perform is to remove the opinion of the employees that

medical service in industry is introduced by employers with the spirit of paternalism. She should overcome the distrust of her charges and show them by good faith and sincerity that no advantage will be taken of them through their dealings with the medical department. Two cases are given, one in which there is complete co-operation between employees and medical service, the other showing little or no co-operation between the two; conclusions are drawn.—M. C. H.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

A Study of the Underwear Industry. With Special Reference to Opportunities for Subnormal Girls. *J. D. MacAlpine. Ment. Hyg., Jan., 1923, vol. 7, pp. 70-101.*

Shall we try to use persons of subnormal intelligence, or shall we segregate and sterilize them? Why not attempt some method of social control whereby the necessarily monotonous operations are performed by those incapable of doing anything more complex? The difficulties of course are almost insurmountable because of the time necessary to train the moron to even a simple task.

The New York Vocational Adjustment Bureau was organized in an attempt to make subnormal girls self-supporting units. A survey of the women's underwear industry was undertaken by the bureau because that is the simplest of all the needle trades. The data were gathered from forty-six different concerns near New York City, employing from forty to sixty persons; the results are presented carefully and, although largely negative, are of interest.

The conclusions are that for the average girl the underwear industry offers the advantages of steady employment, short hours, and the possibility of working up to be a designer. The disadvantages are that the wages are not very high and the shops are often dingy and insanitary. For the exceptional girl, gifted with a sense of color and of line, the opportunities are limited. For the subnormal girl the opportunities are also limited because most shops are small and girls must be able to do more than one job. A subnormal girl might, however, be a ribboner or a presser, or do certain kinds of operating in a section house; but it does not seem worth while to train a girl for an industry in which there are so few openings for her.—S. C.

Variations in Efficiency in Cotton Weaving. *S. Wyatt. Indust. Fatigue Research Board, Rep. No. 23, Text. Ser. No. 7, 1923, pp. 60.*

Investigations in any branch of science tend to become more technical the farther they are followed up. This tendency is manifest in the latest report of the Industrial Fatigue Research Board. It deals with the cotton industry and is the seventh and most weighty report devoted to textile industries. The Board has placed these industries, silk, linen and cotton, greatly in their debt for the work which has been done, and now feels justified in expressing the hope that future inquiries may be by co-operative action in which the industries shoulder their share of the expenses.

The report deals with a great number of observations, more than 1,000,000; hence any tendencies which appear, may be accepted as genuine. During a period of one year, output readings were taken hourly on 261 Lancashire looms, and twice daily on 344 Northrop looms, situated in different weaving sheds. Mr. Wyatt, writer of the report, first describes the conditions of work and the methods which he employed, and next states the results obtained. Then he discusses the numerous factors which influence efficiency; these may be environmental, such as temperature, humidity, ventilation, and illumination; or personal, such as ability, experience, incitement, incentives and fatigue; or yet again physical, such as variation in yarn, or the speed of the loom. Clearly the research has been an intricate and difficult one. The conclusions drawn in many ways confirm those of other investigations. Thus, the efficiency of Monday morning was found relatively low, owing to the week-end effect upon the operatives and also upon the cotton thread; Tuesday, on the other hand, proved generally to be the most efficient day in the week; the efficiency of work before breakfast was consistently low. A progressive change

was detected in the shape and direction of the morning curves of output during the course of the week. The point of maximum efficiency tended to move from the end of the morning spell on Monday to the beginning of that spell on Friday; a tendency most easily explained in terms of fatigue. Bearing upon the same point, the time required to attend to loom stoppages was noted to be greater in the afternoon than in the morning, and to increase progressively throughout both the day and the week. These variations are important indications of the extent to which fatigue may be present in weaving.

Mr. Wyatt is able to state definitely that the best conditions for productive efficiency in weaving in humid sheds require a dry-bulb temperature of 70 to 75°F., and a relative humidity of 80 to 85 per cent. Here is a clear statement upon a matter which has long been controversial in Lancashire. Differences in individual productivity of 22.4 per cent., which compare with 27 and 30 per cent. found among silk weavers, are quoted to support a strong plea for vocational selection of persons who aspire to become weavers and for training those selected in the best method of work. Only thus can unsuitable, uneconomical and fatiguing habits be avoided, and higher efficiency with personal satisfaction be attained.

The report, which is well and clearly written, contains much statistical matter and twenty-six illustrative diagrams and figures. —E. L. C.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

Applications of Psychology to Industry and Business. *C. S. Yoakum. Jour. Personnel Res., Oct.-Nov., 1922, vol. 1, pp. 306-318.*

That applied psychology is becoming a subject of widespread interest is proved by the activities of self-styled character analysts and their followers. It is becoming increasingly evident that psychologists and business men should have a common ground on which to meet. Scientists and workers in such fields as economics and sociology already make use of psychological concepts. Business and engineering schools are moving more cautiously. The findings of the psychologist are, however, being made the basis of modified working conditions in many factories and offices. Human stresses and strains are being calculated, and hit-or-miss methods are giving way before the revelations resulting from hard and honest work of the psychologist.

Granted that the object of every business and industrial organization is to make as compact, loyal, and efficient a group as possible, how can psychology contribute to this result? Job analysis furnishes a complete and definite description of the job. Factory or office layout gives the apparatus. Results appear in amount of work done, quality, time spent, and tolerance of work. Sometimes the application of elementary psychological principles has a marked bearing on efficient results. A case is cited where at a time of labor shortage the mere changing of the title of the job brought applicants, because of a fancied higher social status. Carefully devised methods of induction—or the selection and preliminary training of recruits—and methods of maintenance—or fitting men into their proper niches—are of great value in business. Proper recognition of individual differences determines the selection of individuals for all classes of work, from simple to executive and planning functions. The work of the psychologist in business calls for the research-social type of student who can answer an executive's demand for methods of dealing with people, for business judgment, and for ability to present data by means of charts, condensed tables, and formulae.—G. N. T.

Mental Hygiene in Department Stores. *Mental Hyg. Bull., March, 1923, vol. 1, p. 2.*

At the request of the Harvard Mercantile Health Bureau, a series of three talks was recently given by the Medical Director of the Massachusetts Society for Mental Hygiene to several hundred executives, supervisors, and employees of one of Boston's department stores.

"The primary object of these talks was to acquaint the group with a few of the simpler and more fundamental psychologic mechanisms that underlie personality and behav-

ior problems in store employees. They included attention to every-day conditions as 'nervousness', anxiety, fear, worry, and the like, and stress was laid on the fact that though the external symptoms of these conditions might be expressed in physical complaints, the underlying causes were sometimes due to maladjusted life situations rather than to sheer 'cussedness'."—M. C. H.

PERSONNEL ANALYSIS PROGRAM IN THE PRINTING TRADE. *Report of the Committee on Engineering as Applied to the Printing Industry, United Typothetae of America, Chicago, April, 1923.*

The purpose of the meeting of the committee on engineering as applied to the printing industry, which met in New York in February, 1923, was:

1. To determine what human capacities are essential for each job in the printing industry.

2. To determine what combinations of physique, intelligence, health, hygiene, temperament, interest, contentment, etc., will give the highest efficiency.

3. To develop and devise tests to rate individuals in regard to their various qualifications.

4. To develop progress tests.

The program of the meeting aimed:

1. To select scientifically the new material to be trained for industry.

2. To re-adjust men already in industry into jobs for which they are best qualified.

3. To determine the job for which a man is best fitted.

4. To classify individuals automatically through issuing certificates.

5. To provide man record charts that will be a basis for hiring, promotion, compensation and selling.—M. C. S.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

EATING FOR HEALTH AT THE PLANT RESTAURANT. *Nat. Safety News, May, 1923, vol. 7, pp. 19-21.*

A plant which maintains a restaurant attracts and is able to hold a better class of employees. Practically all plant restaurants provide meals at prices covering only the cost of the food and its preparation; as a rule the rent is not charged to restaurant expense. Any deficit incurred in the operation of the restaurant is regarded by most firms as "an investment in employee good-will." According to information received from members of the National Safety Council operating restaurants the average cost per meal to the employee is from 21 to 45 cents.

In plants where an attempt is made to educate employees in correct habits of eating, bulletins and pamphlets are the methods generally adopted. One method of popularizing balanced meals among employees is the plate luncheon—a method in use in many plants. One plant posts a suggested menu every day in its office cafeteria, upon which it is indicated which foods are fat producing. It is found that the majority of the employees choose a balanced meal.—M. C. S.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

HOURS OF LABOUR IN INDUSTRY: GERMANY. *Internat. Labour Office, Studies and Reports, Series D, No. 4, Oct., 1922, pp. 40.*

Legislation in Germany is presented giving the weekly working hours in various industries, including mines, metal and wood industries, hides and leather, stone industries, chemical, paper, textile, clothing, food, glass and pottery, etc., of federal, provincial, municipal, and transport workers. Proposed amendments of existing legislation are given. —M. C. H.

HOURS OF LABOUR IN INDUSTRY: BELGIUM. *Internat. Labour Office, Studies and Reports, Series D, No. 5, Oct., 1922, pp. 30.*

From this account it is clear that the eight-hour day and forty-eight-hour week form

the standard for hours of work in Belgian industry.—M. C. H.

HOURS OF LABOUR IN INDUSTRY: FRANCE. *Internat. Labour Office, Studies and Reports, Series D, No. 6, Oct., 1922, pp. 54.*

This pamphlet, together with similar ones giving legislation of working hours in Germany and Belgium, is mentioned for the benefit of interested readers. No particular reference is made to the health of workers.—M. C. H.

RECOMMENDATION CONCERNING THE PROTECTION OF WOMEN AND CHILDREN AGAINST LEAD POISONING. *Internat. Labour Office, Official Bull., April 18, 1923, vol. 7, pp. 128-129.*

Certain regulations for the protection of workers from lead poisoning are in force in Germany. These prohibit:

The employment of young persons under 18 years of age and of women in the manufacture of litharge, massicot, red lead, white lead, orange lead, sulphate of lead, and lead chromate.

The employment of young persons under 16 years of age and of women in zinc and lead works and in work connected with furnaces and similar occupations in the course of which they could come into contact with lead; in mixing and pasting in the manufacture or repair of electrical accumulators; in the cleaning of workrooms where the foregoing processes are carried on.

The Orders also contained provisions for the removal of the dust and fumes engendered by lead manufacturing processes. These provisions are of a general character and make no reference to the age or sex of the persons employed, with one exception, in which case they apply partially only to the employment of young persons under 18 years of age.

In order to bring the German regulations into conformity with the recommendation, it would be necessary to extend their operation to young persons under the age of 18 years; it would further be necessary to prohibit the employment of young persons and of women in smelting lead and old zinc insofar as it is carried on on a large scale; in the preparation of solder or alloys with a lead content exceeding 10 per cent.; in the preparation of silicate of lead, and in the cleaning of workrooms in which the processes are carried on. —M. C. H.

OCCUPATIONAL DISEASES AND THE WORKMEN'S COMPENSATION ACT. *Boston Med. and Surg. Jour., March 22, 1923, vol. 188, pp. 416-417.*

Two decisions of the Massachusetts Supreme Court are given, one Pimental's case, and the other Bergeron's case. In the former, decided about two years ago, the Court said:

"If it could be held that the employee (Pimental) was suffering from an occupational disease, still the Workmen's Compensation Act does not, in terms, include disease. See St. 1913, c. 817, s. 12. It cannot be held to cover disease contracted by employees in the course of and arising out of their employment. Pain is not disease, nor is disease resulting in pain a personal injury."

In Bergeron's case, a recent decision, lead poisoning is held to be a personal injury arising out of employment. The date of the personal injury is not the time when the employee is first treated but the time when the accumulated effects of the poisoning, due to his employment, incapacitate him for work.—G. N. T.

NEW REGULATIONS CONCERNING COMPENSATION FOR DERMATITIS. *Internat. Labour Office, Indust. and Labour Information, Feb. 9, 1923, vol. 5, pp. 268-269.*

The Amalgamated Union of Operative Bakers, Confectioners and Allied Workers of Great Britain pointed out to the Home Secretary that although the schedule of industrial diseases included dermatitis as a trade disease it went on to say that a person should not be entitled to compensation under the provisions of the Workmen's Compensation Act if disabled only for employment in the particular process in which the disease was contracted. They showed that this limitation constituted a grave injustice to operative bakers and confectioners, and quoted instances in which bakers had been entirely disabled for their trade by the disease and had been denied compensation because they were still able to obtain employment at a much lower wage as unskilled laborers in other trades. They pointed out that morbidity figures for the disease were increasing and asked that steps be taken to place bakers pre-

vented by dermatitis from earning their living in the only trade they knew on the same level as other persons in respect of the Workmen's Compensation Act.

The Home Office altered the schedule so that, if it can be proved that a man has contracted dermatitis through long, continued exposure to dusts or liquids in the industry, he will be entitled to the ordinary benefits of the Compensation Act.—M. C. H.

New York State Insurance Fund Sound and Economical. *Am. Labor Legis. Rev., March, 1923, vol. 13, pp. 78-81.*

In its report to the New York legislature, the official Lockwood Investigating Committee concludes that the exclusive state plan of compensation insurance will afford the following advantages: It would promote more prompt payment of losses; would obviate heavy expenditures in commissions; would promote co-operation between employers and employees in reducing accidents; would reduce litigation; and would permit the law to become more easily liberalized in favor of the workmen.—L. A. S.

Some Sane Thoughts on Unemployment Insurance. *Factory, April, 1923, vol. 30, p. 413.*

Aside from the fact that unemployment insurance in England shows the inadequacy of government control of this problem, it offers nothing constructive for the United States to work upon.

There is large loss in this country due to the permanent loss of workers whom it is necessary to lay off temporarily during slack seasons. These workers might be attracted to return to work after the dull period is over by some form of unemployment insurance controlled by private rather than public interests.

Individual plants which have met with considerable success by trying out some form of insurance are the Dennison Manufacturing Company, many of the ladies' garment plants in Cleveland, and the Dutchess Bleachery, Incorporated.

A bill, known as the Huber Bill, is now before the Wisconsin Legislature; it provides for the organization of employers of the state into a Mutual Employment Insurance Company. Each employer will pay a small premium periodically into a state fund. The employer's quota will depend upon the frequency of his seasonal or periodical bad times. Those who hire and fire will pay the higher rates; those who keep their men steadily will pay the lower. Causes of unemployment will be studied and their elimination attempted. The outcome of this bill is of great importance to the manufacturers of this country.—M. C. H.

Is State Insurance Fund Desirable? *Manufacturers' News, March 17, 1923, vol. 23, p. 13.*

It is recommended in the following paragraphs that the public consider the matter carefully before deciding that state insurance in Illinois is a wise and a proper method to handle compensation for industrial accidents.

"The present compensation law has been compulsory only since 1917, since which time the number of accidents in mines has shown an increase of 260 per cent. The increase since 1913 has been 375 per cent. In this time the tonnage produced has increased only 51.7 per cent. and the number of employes only about 25 per cent.

"This increase in the number of accidents in Illinois mines is not a result either of increased hazard or growing inefficiency of plant management.

"The possibility of the capitalization, under the compensation act, of every injury received, minor as well as major, is causing every incident to be reported and paid for. It is this that occasions the apparently heavy increase in the number of accidents that have been reported since the compensation act became compulsory.

"For the 34-year period from 1883 to 1916 inclusive, there was an average of 56,710 tons produced to every non-fatal accident in Illinois mines. The average tonnage per non-fatal accident in 1921 was only about 18,000 tons."—M. C. H.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

VOLUME V SEPTEMBER, 1923 NUMBER 5

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GENERAL

INDUSTRIAL HYGIENE IN ITALY. *L. Devoto. Il Lavoro, March, 1923, vol. 14, pp. 65-76.*

Professor Devoto gives first an outline of the history of the development of industrial hygiene in Italy from its beginning in 1865 with the appointment of mine inspectors. Coincident with the rise of industrialism in Italy, early in the twentieth century, towns and local groups became interested, among them the city of Milan, which was awarded a gold medal in 1902 by the Minister of Agriculture, Industry, and Commerce, in recognition of its excellent legislation. Another merit of the same city was the founding in 1902 of the Clinic for Industrial Diseases, which was eventually opened in 1910. The same minister was the creator of a Central Bureau of Labor, which today is part of the Ministry of Labor and has authority to make statistical and investigatory studies on trades, accidents, and health of various classes of workers. Owing to the able handling of this position by Prof. Monte Martini a real office of Inspector of Labor with medical-sanitary function was created in 1912. This department has seven headquarters—Turin, Milan, Brescia, Bologne, Rome, Naples, Catania. Its functions are to insure the carrying out of the laws, to supervise the execution of hygienic measures, to investigate the hygienic condition of industries, and to prepare statistical and other studies. An important part of this inspectorship is the Bureau of Hygiene and Sanitation, called also the Medical Inspectorship of Labor, which consists of two physicians, a chief, and an inspecting physician. This bureau was created to inspect and discuss the application of sanitary measures, and to make suggestions and laboratory studies, and is allowed to call on sanitation officials and scientific laboratories for assistance. This began to function in 1915, and now reforms are proposed to increase the personnel by adding a physician for each of the zones, and a technical staff at the central office. In 1921 this office made 3,532 inves-

tigations covering 143,274 employees, and found 518 infringements of the law.

Since 1919 the government has been preparing a general sanitary code for work of all sorts. This code will cover factory construction, walls, floors, and lighting. It provides for rest periods where eyestrain is common, and prescribes maximum temperatures and protection against radiation and burns. It considers fumes, air moisture and contamination, water for drinking and washing, noise, and personal and shop hygiene, means of protection against insects and filth, hygiene of rural factories, protection against harmful substances, factory medical service, and rules for women and children. For its successful application the code requires the co-operation of local organizations.

Rome has organized on its own account a labor office and certain large factories have their own medical staff.

The clinic in Milan is giving practical courses in industrial hygiene for nurses. There are three journals: *Il Lavoro*, organ of the Industrial Clinic of Milan, *La Sanità Proletaria*, and *Bollettino del lavoro e della previdenza sociale* of the Ministry of Labor. A national congress of industrial medicine is held every two years since 1907.

The Italian section of the International Association for Labor Legislation has made a number of studies on hygiene. Special legislation has also been passed for emigrants, rice workers, tunnel workers, and railroad employees. The National Insurance Fund requires certain hygienic protection and proper treatment in case of illness, and is permitted to encourage, by prizes or other means, studies in the prevention of diseases or accidents from work, and to subsidize clinics and institutions for rehabilitation.

Official interest in industrial medicine is marked; government scholarships in the industrial clinics of Naples and Milan have been given out, as well as prizes for papers on the subject.

The clinic for occupational diseases in Milan is developing into an institute of industrial medicine. Its functions include postgraduate teaching for physicians, with lectures and clinical and field teaching. The hospital has accommodations for eighty bed patients besides the outpatient department; then there are laboratories, lecture halls, and a museum of hygiene. Relations are established with working people who are encouraged to visit the clinics by day or evening. The personnel provided by the state includes a professor, his assistant, and five associates.

There is an industrial clinic in Naples. Some instruction is given in industrial hygiene in Genoa, Pisa, Florence, Modena and Rome. There is no intention of creating a huge bureaucracy of medical inspectors but rather a number of physicians with training in industrial medicine who can be called upon to aid the various regional inspectors.

Furthermore, industrial hygiene is now taught in the technical schools, and the Milan Polytechnic School possesses a museum of industrial safety which issues papers on technical devices.

The outline of organization for efficient protection of Italian workers exists as depicted above, and through the co-operation of the medical profession and wise government leadership will result in more valuable return.
—J. W. S. B.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

A Case of Mental Disorder Arising from Chronic Lead Poisoning. *J. F. Smyth. Jour. Ment. Science, April, 1923, vol. 69, pp. 208-209.*

Lead poisoning as a factor in the etiology of insanity has of late years become rare, as a result of improved hygienic conditions among workers.

Acute lead poisoning usually gives rise to delirium, which is preceded by headache, insomnia, and frightful dreams. Afterwards tinnitus, flashes of light, mental depression and confusion follow. The delirium is intense, and is accompanied by terrifying hallucinations. Finally exhaustion, stupor and coma may supervene, or epileptiform convulsions may develop. In acute cases marked physical signs of lead poisoning may not appear, the mental symptoms predominating. Chronic lead poisoning is most insidious in its on-

set and progress. The mental changes arising therefrom are characterized by depression, apathy, and confusion, with periods of delirium intervening, and sometimes convulsions.

The following case was considered to be worth recording:

J. W. I., aged 46, was admitted to the hospital on July 15, 1922. He was very excitable and resistive, declaring that he had been brought there by conspiracy. He had locked himself into a room in his house the day he was certified and violently resisted being removed. The following day he was much quieter but was very voluble and rambling in his statements. He was distinctly persecutive toward his wife. His general intelligence was good, but his memory was slightly defective and his statements unreliable.

Physical examination revealed marked anemia and evidence of tuberculous involvement of the right lung. Right arm showed weakness and wasting of the extensor muscles of the forearm, with diminished hand-grip and loss of reflexes. Triceps was also markedly wasted. The patient said that his arm had become "paralyzed" twelve months ago, but that it had improved.

Most of the teeth were missing, the remainder were decayed, and the gums were slightly ulcerated. Attempts to obtain any further history from the patient were unsuccessful owing to his mental condition. The following particulars were elicited from his wife. Over twenty years ago he was employed in a shipyard working with white lead for a long time. After the armistice he went into the newspaper trade at which he continued up to the time of his admission to the hospital. Two years ago he became reserved, irritable, and short-tempered, and began to be antagonistic to his wife. He would close the windows after lighting a large fire on a hot summer day and refuse to allow her to open them. He gradually became more suspicious and quarrelsome, and began to threaten her. Finally he became so dangerous that she had to have him certified. About fifteen months ago he began to suffer from attacks of abdominal pain frequently followed by vomiting. Three months later his arm became paralyzed. Finally his teeth became affected and his gums became painful.

The points of interest in this case are:

1. The patient's early employment presumably impaired his nervous system, leaving a susceptibility to plumbism which was lighted up by his later constant contact with newspapers.

2. Appearance of mental symptoms before the physical signs of lead poisoning showed further evidence of a damaged nervous system.

3. Distinct resemblance of mental symptoms to those of alcoholic paranoia showed analogy in effect on an organism of a general chronic toxemia.—M. C. H.

THE HISTOGENESIS OF TAR CARCINOMA. *R. Bierich. Abstr. as follows from Dermat. Wchnschr., 1922, vol. 75, p. 1081, in Arch. Dermat. and Syph., June, 1923, vol. 7, p. 809.*

Having applied tar to white mice, the author found that hyperkeratosis ensued on an average of forty days after the first application, epithelial hypertrophy after eighty days, and epithelioma after 131 days, with slight variation. If the tar applications were discontinued during the stage of epithelial hypertrophy, epithelioma followed at the usual time. During the pre-epitheliomatous stage, the underlying connective tissue cells became swollen, the proportion of elastic tissue increased, and the number of mast cells was augmented. These dermal and epidermal premalignant changes seemed to be due to the action of the tar itself; they may also be produced by other agents, such as arsenic or roentgen rays. When the epithelioma appeared, these changes vanished. When tar and arsenic were both used, the reaction was increased, and the development of epithelioma was delayed until the one hundred and eighty-eighth day, which would seem to indicate that the earlier changes are protective in nature.—M. C. H.

DUST HAZARDS AND THEIR EFFECTS

RADIOGRAPHY IN ITS RELATION TO MINERS' PHTHISIS ON THE WITWATERSRAND. *W. Steuart. Arch. Radiol. and Electroth., Feb., 1923, vol. 27, pp. 277-286.*

Owing to the heavy mortalities from silicosis among miners in the Witwatersrand, South Africa, a Miners' Phthisis Medical Bureau was established in 1916 at Johannesburg under government auspices. The staff of this Bureau examines all candidates for underground work in scheduled mines, all regular workers every six months, and all applicants for compensation. A rigid and thorough clinical examination is given, and a standardized radiographic investigation made. Reports are considered by all members of the Bureau and decisions rendered as follows: (1) whether an applicant may become an underground worker; (2) whether a miner may continue working underground; and (3) in the case of a man who has incurred disability from silicosis, its extent and degree of permanence, with a view to indicating the appropriate compensation.

The Bureau has built up an elaborate organization which has succeeded in making over 200,000 radiographs, together with the medical dossiers of the 45,000 Europeans and 11,500 natives to whom the radiographs refer.

The conclusions drawn from the unique mass of information so compiled are of the greatest interest. Men with the narrow vertical or asthenic type of heart have been found so liable to develop tuberculosis and also silicosis that they are declined for work in the mines; such men are almost invariably under weight. Further, as silicosis develops in men with normal pyramidal hearts, the shadow tends to become more and more vertical, but not to the same extent as in simple tuberculosis. No explanation is offered of the apparent association of the vertical heart with a predisposition to pulmonary tuberculosis.

The paper is illustrated by eight excellent radiographs exhibiting the various conditions found. Most adult males are found to show a certain amount of fibrosis in the root areas with the bronchial tree definitely outlined; as silicosis develops, the finer air passages throw shadows which appear as a reticular formation. This appearance next changes to a general miliary formation which subsequently becomes coarser with the nodules less numerous. When tuberculosis complicates the picture at any stage, unsymmetrical and usually unilateral clouds appear while the heart shadow becomes "vertical." These changes are illustrated at the Bureau by a standard series of selected radiographs, the interpretation of which, in almost all instances, has been verified by postmortem examinations.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Progressive Idiopathic Atrophy. *Waugh. Arch. Dermat. and Syph., June, 1923, vol. 7, p. 825.*

A woman, aged 40 years, who had worked in factories for many years, had a disorder which had been present about two years, beginning on the lower extremities and later involving the hands and arms. The skin presented a bluish red atrophic and wrinkled appearance, with slight branny scaling in places. Practically no subjective sensation was present.—M. C. H.

Eyesight Conservation in Industry. *R. Gordon. Indust. Management, June, 1923, vol. 65, pp. 345-346.*

The report of the Committee on Elimination of Waste in Industry of the Federated American Engineering Societies is authority for the statement that of 42,000,000 men and women engaged in industrial employment in the United States there are 25,000,000 whose vision is more or less defective. Little exact information as to what extent of defective vision among employees affects industrial output, and what efforts are being made to correct such a condition, is available. This work has been undertaken by the Eyesight Conservation Council of America under the auspices of the Federated American Engineering Societies, and a comprehensive research covering all phases of industrial activity as well as of conditions in the schools is now being made.

Those whose occupation requires them to scrutinize their work closely—most office workers, bookkeepers, proofreaders, and others engaged in corresponding lines of work—find that sooner or later they must use glasses. It is equally important for industrial workers in general to have normal vision because usually they must focus their

attention more or less continuously on a work bench, machine, or some process involving clear sight.

Plant executives have recently begun to direct their attention to the question of their employees' eyesight, and reports are now available. In a paper box factory employing about 3,000 workers, it was found that 2,160, or 72 per cent. had imperfect eyesight. In another case, a metal mesh bag factory employing 200 girls in a department where keen eyesight was essential for the operation of fastening the long strips of metal mesh with fine metal rings, an examination disclosed the fact that 83 per cent. of the workers required glasses. About 8 per cent. of the total number were found to be wearing glasses that were improperly adjusted, while barely 9 per cent. had normal vision. Other examples of visual defects are given.

In addition to the increased production that results from better vision, the correction of eyestrain removes a factor of irritation to the nervous system, and the resulting calmer state of mind contributes to a more cheerful mental outlook all through the shop.—M. C. H.

Conjunctival Flap for Perforating Wound of Eye. *J. B. Stanford. Am. Jour. Ophth., May, 1923, vol. 6, p. 423.*

While a man was running a machine for shaping wheel spokes (on October 6) something, presumably a splinter of wood, struck his left eye. When seen about one hour later, he had a wound of the cornea at the inferior temporal margin, extending about 2 or 3 mm. toward the center of the cornea. The iris was prolapsed through the wound. A conjunctival flap was prepared, the prolapsed iris excised, toilet of the wound as in intraocular operation, and the flap was drawn up over the wound. On October 10 the stitches had pulled out and the flap was slipping off the cornea. The pupillary margin was seen to be intact, and the iridectomy was of the button-hole type. The eye was not entirely clear until one month after this date. At that time the vision was 20/20 without correction. The anterior chamber was normal and there was no synechia.

Another case is mentioned of a man who, while cutting a piece of brass off a rod, was injured in the left eye by a chip. About two hours later, he had a horizontal wound extending from near the inner canthus into the cornea for about 4 mm. The wound included all the coats of the globe, and there was a considerable iris prolapse. The flap in this case was brought up from below and the entire extent of the wound was covered. On January 27 the flap had slipped back into place, the wound was closed and the pillars of the coloboma were free. An opacity of the posterior capsule was seen directly under the corneal scar.

On March 1 the vision in this eye was 20/50, improved to 20/25 by plus 2 S. combined with minus 2.50 C. Ax. 75°. The media were clear except for the opacity noted above, and the fundus was normal. In the latter part of March, the man suffered from an acute iritis in this eye, which cleared up in one week. Some vitreous opacities were seen at this time.

He was not seen again till December 11, when the vision of the left eye was 20/70, improved to 20/25 plus, by plus 1.50 S. combined with minus 3 C. Ax. 75°.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

New Jersey Industrial Safety Museum. *L. Erskine. Nation's Health, May, 1923, vol. 5, pp. 285-288.*

This article describes the New Jersey Industrial Safety Museum which serves as an official clearing house for co-ordinating the conservation activities of the department of labor, of the compensation, accident, fire, and life insurance companies and of the public service and railroad carriers operating in the state of New Jersey. While the museum is primarily concerned with the lessening of industrial injuries, it also covers the field of public and home accidents, and of community hazards.

The museum contains among other things exhibits of industrial lighting, of industrial ventilation, of standard type steam power equipment, of different types of flooring, a fire prevention display, a model cafeteria,

model washroom equipment, and model first-aid room, and an industrial hospital exhibit.

The stabilizing of labor turnover by means of provisions for betterment, improved employment methods, co-ordination of the personnel activities, and approved types of safety shop committees are covered in a room reserved for this purpose. Group insurance, industrial housing, and community and plant hygiene for the reduction of tuberculosis are also included.

The article contains a description of the procedure for making the exhibits available to and of real benefit to manufacturers.—K. R. D.

Mental Factors in Accidents. *W. R. Woodbury. Indust. Doctor, May, 1923, vol. 1, pp. 87-98.*

A discussion of certain mental errors related to industrial accidents, of the importance of health in industry, the value of physical examinations of employees, the necessity of education of workers regarding industrial hazards and the relation of rehabilitation to workmen's compensation.—W. W.

The Cause and Cost of Ladder Injuries. *C. N. Young. Safety Engin., April, 1923, vol. 45, pp. 106-107.*

An analysis of sixty cases of ladder accidents taken at random showed an average cost of $288 reckoning in each case compensation and medical expense.—R. M. T.

Accident Reduction. *Am. Medicine, April, 1923, vol. 29, pp. 199-200.*

The activities of the United States Steel Corporation in accident prevention have resulted in the definite saving from maiming and deaths of more than 35,000 employees during a period of sixteen years.

With the installation of mechanical safeguards only 4.88 per cent. of accidents were due to machinery causes, while 44.04 per cent. were due to hand labor. This was the chief cause of accidents because of personal carelessness and the failure of workmen to follow directions given for the purpose of insuring safety. Nine thousand employees are members of safety committees and they spread the principles that will reduce this hazard to the workmen. It is realized that the safe operation of industry cannot reach its highest level unless the continued interest of the employees is secured.—M. C. H.

California Reduces Fatalities. *Safety Engin., April, 1923, vol. 45, pp. 116-117.*

The report of the Industrial Accident Commission of California shows a decrease of forty-two industrial deaths in 1921, as compared with 1920, while the rate of eight years is lowered 38.39 per cent.

The Commission emphasizes the need of a placement bureau to assist in recovery in some cases, and to provide work in those instances where it is necessary to change occupations because of permanent injuries.—R. M. T.

Steel Corporation Cuts Accidents. *Safety Engin., April, 1923, vol. 45, pp. 101-103.*

This article gives a brief résumé of the accomplishments of the United States Steel Corporation in reducing the number of accidents. Intensive activities of the safety department have reduced the accidents 56.13 per cent. since 1906, saving 35,313 men from injury.—R. M. T.

Mine Fire Control Safety Orders Adopted. *Safety Engin., April, 1923, vol. 45, p. 103.*

These orders were compiled by committees of the mine operators, mine employees, the United States Bureau of Mines, the Industrial Accident Commission, and mining engineers. Some of the more important requirements are given.—R. M. T.

Mine Rescue Work in the Southwest. *R. H. Marks. Nat. Safety News, May, 1923, vol. 7, pp. 33-34.*

This is a detailed report of the second mine rescue maneuver held by the Globe-Miami District Mine Rescue and First Aid Association.

"Such maneuvers give the men trained in the use of mine rescue apparatus a fair idea of what would be expected of them in actual mine rescue work. It increases their confidence in the apparatus, renews their interest in the work and increases their efficiency in the work of rescuing men and building brattices.

"It also shows to a great extent what can be expected from the use of helmet men in case

of mine fires, brings out the faults and shortcomings of teams and gives a basis to work on in case of actual fire conditions. It shows what can be done in the organizing and placing of crews, methods of attack and means that could be resorted to in rescuing and recovering men and bodies.

"The men are taught the importance of closer inspection of their apparatus and the dangers involved, to themselves and other members of the team, in case of carelessness or haphazard inspection of apparatus."—M. C. S.

ACCIDENT PREVENTION IN THE OIL FIELD. *R. S. Bonsib. Nat. Safety News, June, 1923, vol. 7, pp. 19-21.*

The oil industry, although the second largest and one of the great basic industries of the United States, is the last to join the war against preventable accidents. A large amount of effective work has recently been accomplished by the Carter Oil Company, the Standard Oil Company of Louisiana, and other oil producing subsidiaries of the Standard Oil Company of New Jersey. Their program consists (1) of making their operations as mechanically safe and as efficient as possible, and (2) of educating their employees to safeguard themselves at their work. An account of safety devices which have been installed is given.—M. C. H.

MAKING MAXWELL MEN AND METHODS MORE SAFE. *E. H. Cotcher. Nat. Safety News, May, 1923, vol. 7, pp. 37-38.*

The author outlines the organized safety work which is being undertaken throughout the various plants of the Maxwell Motor Corporation. One division of the work will deal with the prevention of accidents through the education of the worker and through the provision of proper mechanical protection. The other will deal with the proper care of injured workmen in plant and city hospitals, and in the home, and the necessary assistance to the families of workmen who suffer injury in their daily work.

Every three months each foreman is to be given a card showing his accident experience for the previous three months and also the estimated maximum loss which his department should have shown. Every Monday a comparative statement of the standings of all departments is to be posted, and the department which stands highest is to be given a banner to be kept until some other department has won it by a better record. At the end of three months, the whole department in each plant which has the best record is to be given a dinner by the company.—M. C. S.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

THIRD ANNUAL REPORT OF THE INDUSTRIAL FATIGUE RESEARCH BOARD TO 31st DECEMBER, 1922. *H. M. Stationery Office, 1923, pp. 83.*

The reports of the Fatigue Board are now becoming an annual event. The organization of the work which was rearranged two years ago is now proving itself; it interlocks closely with the activities of the Medical Research Council which exerts supervision over the whole. Seven special reports have been issued in the twelve months ending December 31, 1922, which have dealt for the most part with investigations in textile industries, but have also been concerned with accident causation, the laundry trade, and the manufacture of pottery. Gradually certain principles are emerging from these trade inquiries, and recourse is being had to laboratory work to test them and to disclose other points which in their turn require to be investigated in the field of practice. An instance may be quoted: physiological evidence from (1) laboratory experience, and (2) observations on operatives; and inquiries into efficiency in (*a*) cotton weaving and (*b*) linen weaving, all point to the same conclusion—namely, that any rise of the wet bulb temperature over 73°F. is disadvantageous.

In addition to a general review of work done and in progress, the report contains six short contributions from investigators. Mr. E. Farmer writes on the technic of this new science. The best methods of exploration have gradually to be found. There must be rigid adherence to scientific method, but new and complicated problems have to be faced

and new technic has to be evolved. At present information is obtained (1) by observation from records kept by firms, and from data collected by an investigator in a factory; (2) by experimentally altering either methods of work or conditions of work and observing the results; (3) by testing groups of persons physically and mentally to determine their fitness for certain occupations, their fatigability, their liability to accidents and the like. Each procedure is associated with errors of collection which have to be eliminated or sufficiently minimized.

Miss May Smith discusses the use of the sample as an adequate symbol of output when for various trade reasons total output is not comparable. The method employed is to discover some act or series of acts which is repeated from time to time, and to take the period needed for the performance to represent the state of the worker's activity at the time. This method was used with success in the laundry trade and should in the future prove of great utility.

Mr. S. Wyatt contributes observations on industrial conditions; he finds a growing tendency to modify conditions in the direction of the worker, rather than, as of old, to leave him to adapt himself to the conditions. He traces this tendency in the cotton industry in the provision of suitable temperature and humidity, and of better illumination; and sees its need in minimizing noise and avoiding monotony, in vocational selection of workers, and in vocational training. The application of scientific methods to the human element in industry presents a wide and promising field.

The influence of atmospheric conditions upon efficiency is considered by Dr. H. M. Vernon. He draws instances from inquiries made in weaving, deep mining, the production of iron, steel, and tinplate, the frequency of accidents, and the occurrence of sickness and mortality. He shows that health and efficiency are profoundly influenced by atmospheric conditions, but that much more exact information is required than we at present possess. The same investigator points out the directions in which work might be extended in the pottery trade, particularly regarding the drying of ware, estimations of dust, time and motion study, and labor-saving devices. This old-time industry lends itself to modern scientific methods on progressive and remunerative lines.

Mr. H. C. Weston writes a note on machine design in relation to the worker. The neglect of consideration for the operative by machine designers is stressed; and the advantages to be obtained through attention to the matter in reduction of accidents and greater productivity are pointed out. Careful work is required, directed in the first place to modifying such ubiquitous machines as the loom, the lathe, and the stamping press to the needs of the workers.—E. L. C.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

A Case of Caisson Disease, or Divers' Paralysis, Treated with Compressed Air. *W. H. Perry. Jour. Am. Med. Assn., May 19, 1923, vol. 80, p. 1455.*

The patient suffered complete loss of control of the lower extremities following a rapid ascent from his third dive in 95 feet of water in the course of two days. Thirty minutes in a recompression tank at 50 pounds pressure gave complete relief of all symptoms.—K. R. D.

HEAT, COLD AND HUMIDITY

The Kata-Thermometer in Studies of Body Heat and Efficiency. *L. Hill and others. Med. Res. Council, Special Rep., Series No. 73, 1923.*

This report is a continuation of the two previous reports by Dr. Leonard Hill on "The Science of Ventilation and Open Air Treatment." It is divided into a number of

independent sections, several of which are written by other investigators who have been associated with Dr. Hill in his kata-thermometer work. In Part 1 Miss D. Hargood-Ash and Leonard Hill describe recent investigations on the calibration of the kata-thermometer, and discuss the formulae which fit the experimental data, while in Part 2 Leonard Hill gives a number of charts of kata and temperature records which are taken in London, Switzerland, and other localities. The other sections of the report, which deal with the application of the kata-thermometer to questions of health and of industry, are of more general interest, and emphasize the value of the instrument in many fields of inquiry.

Numerous observations were made by Leonard Hill and J. A. Campbell on the metabolism of sanatorium patients in relation to the cooling power of the air to which they were exposed. The metabolism was investigated by the method of indirect calorimetry introduced by Douglas and Haldane, and it was found that the heat production of the body was kept at a high level in children who lie in cots in the open air exposed to wind and sun. The patients absorb the radiant warmth of the sun, while cool air surrounds and cools the shaded parts of their bodies. The heat production of clothed adults exposed to cool open air is increased about 50 per cent., and that of children is increased 50 to 100 per cent. above that of individuals resting in a confined chamber. The light rays absorbed cause pigmentation of the skin, and the pigment prevents sunburn. Patients require to be gradually exposed to the sun and allowed to pigment, and they must also be gradually exposed to cold air until they are accustomed to it.

To test the effect of cooling power on human efficiency, observations were made in a wind tunnel, the floor of which was provided with a wind tunnel on which a subject could walk or run at a given speed. It was found that adequate cooling power during the exercise kept down the pulse, and greatly relieved the heart. A similar fact was observed when work was done on a bicycle ergometer. These results should be considered in connection with the observations on "The Use of the Kata-thermometer in Industry," which are described by H. M. Vernon. The same author, in another section of the report, discusses "The Index of Comfort at High Atmospheric Temperatures." It was pointed out by Haldane that the maximum temperature which can be borne for some hours without the development of pathological symptoms, such as heat stroke, depends on the *wet* bulb temperature, and not on the dry bulb, or the degree of humidity. Haldane found that in subjects who were stripped to the waist the endurable limit of wet bulb temperature was about 88°F. (31°C.) when resting, and 78°F. when doing a moderate amount of mechanical work (step climbing at the rate of 14 feet per minute). Vernon confirmed Haldane's chief conclusions, but he found that the endurable limit of air temperature is greatly affected by acclimatization. In the final experiments of a series it was about 6°F. higher than in those made a month earlier (for example, when no clothes were worn, and mechanical work was done, it was 88.5° and 82.5° respectively). The acclimatization depended on the fact that at a given rise of body temperature, induced by the atmospheric conditions, both the pulse rate and the respiration rate showed a much smaller degree of acceleration, while the perspiration rate increased.

In another section of the report T. Bedford gives a number of records of kata and temperature observations in factories warmed by steam pipes and by heated air (plenum installations), and in still another section T. C. Angus describes the ventilation tests which he made on board a large Atlantic liner. He makes a number of suggestions for increasing the comfort of the passengers, and it is clear that further investigations ought to be pursued on other ships, both small and great. The kata is particularly valuable for the purpose, and Angus shows that the heating of cabins by hot air is a mistake, and involves unnecessary and costly heating appliances. As a rule the passenger suffers from too low a cooling power in his cabin, and finds it difficult or impossible to get the fresh and cool air which he desires.—H. M. V.

WOMEN AND CHILDREN IN INDUSTRY

THE FAMILY STATUS OF BREADWINNING WOMEN. *U. S. Dept. Labor, Women's Bur., Bull. No. 23, 1922, pp. 43.*

This is a report of a detailed study of material in the census schedules on the family status of breadwinning women in Passaic, New Jersey.

Twenty-six tables are given showing the proportion of women breadwinners from the total female population 14 years of age and over; the percentage of women working in their own homes or outside their homes; the number and percentage of women by nationality; number unable to speak English; number by marital status; family status and family responsibilities; and the nationality of breadwinning women by industry and occupation.—M. C. H.

THE OCCUPATIONAL PROGRESS OF WOMEN. *U. S. Dept. Labor, Women's Bur., Bull. No. 27, 1922, pp. 37.*

A report is presented showing the occupational progress of women. The report is an interpretation of preliminary census statistics of women in gainful occupations. In 1910 there were 8,075,772 women over 10 years of age gainfully employed in the United States, while in 1920, 8,549,511 women were occupied. This number represents an increase since 1910 of nearly half a million, or 17.1 per cent. Several tabulated lists of women are given according to their employment in various occupations.—M. C. H.

CHILDBIRTH PROTECTION. *Nat. League Women Voters, Washington, 1923, pp. 11.*

This report is written to make clear to the members of the National League of Women Voters the reasons for prohibition of the employment of women six weeks before and after childbirth. Various factors met in industrial work, such as continuous standing, lifting heavy materials, the use of foot treadles or other work injurious to expectant mothers, justify the requirement of a rest period during the confinement period. Figures are given showing an unfavorable report of births in an industrial city where, of every 1,000 births, 227.5 babies died.

France has adopted the plan of factory nurseries where babies may be nursed during factory hours, yet neither England nor the United States looks with favor upon this plan. Statistics showing the effect of factory work during this period are given. The serious consequences are pointed out.—M. C. H.

CHILD LABOR AND THE WORK OF MOTHERS IN THE BEET FIELDS OF COLORADO AND MICHIGAN. *U. S. Dept. Labor, Children's Bur., Pub. No. 115, pp. 122.*

This report gives in very full detail a description of conditions in the beet fields of two states. Exemption of agricultural work from the minimum age provision of child labor laws makes it possible to employ children of any age. Full advantage is taken of this opportunity. Children as young as 6 years of age are frequently employed. The work consists of blocking and thinning, hoeing and pulling, and topping. A large part of this work is done by migratory families, all members taking part. Hours are long, often running to twelve a day. The best available information showed that a child could block and thin about one-third of an acre per day; could hoe two-thirds of an acre; and could pull and top an area of one-fourth an acre. Women's work was not a mere helping out in the fields when household duties permitted, but a serious occupation pursued usually for ten and sometimes for twelve hours a day.

Such conditions had the inevitable result upon health. Physical examinations of children disclosed a high percentage of orthopedic defects, 66.1 per cent. of the entire group of more than 1,000 examined having cases of winged scapulae. Flatfoot was also of common occurrence. Neglected teeth, diseased tonsils, and defective eyesight were all numerous. One hundred and fifty cases of malnutrition were found in the group.

Sanitary conditions frequently left much to be desired. "Beet shacks" furnished by the farmers for the temporary occupancy of laborers during the beet season were frequently in bad repair and not weather proof. Typical shacks were built of tar paper, corrugated iron, or rough boards, often having but one door and one window, and infested with vermin left by previous tenants. Such buildings, besides offering slight protection from rain and snow, were exceedingly hot in summer and practically impossible to heat in cold weather. Overcrowding caused com-

fort and convenience to be sacrificed, and made privacy impossible. Fifty families, consisting of from three to eleven per family, lived in one room. One of the households included a father, his son and daughter, both over 16 years of age, a younger child, and a girl over 16 who helped the family with the beet-field work. Complaints of drinking water were frequently made on the ground of its being unpalatable or impure. Conditions were somewhat better in Michigan than in Colorado, except as to overcrowding.

A large number of tables of statistics show with what care the investigation was made. Illustrations help the reader to understand the nature of the work, and the conditions under which it is carried on.—G. N. T.

STATE SUPERVISION OF THE ISSUANCE OF EMPLOYMENT CERTIFICATES. *T. Frye. U. S. Dept. Labor, Children's Bur., Pub. No. 116, pp. 23-30.*

This paper gives the results of experience in issuing employment certificates in the state of Wisconsin. Here, the permit age has been raised to 17 years. A vital feature of the compensation law provides that if a minor of permit age or over is injured while employed without a permit, or if a minor of permit age or over is injured while employed at prohibited work, the minor shall be entitled to treble compensation for the injury, and the employer shall be primarily liable for the payment of the additional compensation. If the employer is unable to pay the extra compensation, the compensation-insurance carrier becomes liable. Full responsibility for the issuance of child-labor permits is placed upon the State Industrial Commission, which designates qualified persons to assist in the work. Close co-operation with schools is maintained, and inspection of working conditions constantly made by thoroughly trained women inspectors.—G. N. T.

THE PROCEDURE AND ORGANIZATION OF AN EMPLOYMENT-CERTIFICATE OFFICE. *A. S. Davis. U. S. Dept. Labor, Children's Bur., Pub. No. 116, pp. 3-11.*

The Department of Vocational Guidance of the Chicago public schools includes the employment-certificate division, the vocational guidance and placement division, and the industrial studies division. The first of these divisions issues employment certificates to boys and girls between the ages of 14 and 16 when they leave school to work. The child labor law of Illinois makes the following requirements for obtaining a certificate:

1. The minor must be 14 years of age.
2. He must have completed at least the sixth grade in school, and be able to read and write legibly simple sentences in English.
3. He must have a promise of employment.
4. He must be physically fit for the kind of work that he is going to do.

The child is first interviewed by a vocational adviser who is often able to demonstrate the advisability of remaining in school. Complete information is secured as to age, school record, and the intended employment. A doctor then makes a physical examination with special reference to the proposed work. From 20 to 30 per cent. of the children examined are found to be physically unfit for work and their certificates withheld until they are in good condition. Co-operation with local clinics and dispensaries in building up the health of such children has been an important development. If a child is found to be physically fit for employment, a certificate is mailed direct to the employer. This certificate must be returned when the child leaves, and the latter must undergo another physical examination before he can secure new employment. The certificating office works in close co-operation with school principals, the compulsory education department, the continuation schools, and the factory-inspection department. Children between 14 and 16 must attend the continuation schools eight hours a week. A deputy factory inspector assigned to the vocational guidance and employment certificate bureau investigates all complaints regarding violations of the child labor law and brings the bureau in close touch with conditions in the establishments where minors are employed. Every effort is made to see that the child going to work has the benefit of advice, guidance, and employment supervision during the first years of his working life.—G. N. T.

THE VALUE OF CERTIFICATE-OFFICE RECORDS TO THE STUDENT OF CHILD LABOR PROBLEMS. *M. E. Campbell. U. S. Dept. Labor, Children's Bur., Pub. No. 116, pp. 14-21.*

Careful analysis of working permits for children reveals a fund of information, the value of which cannot be over-estimated. Statistics of working permits are vital statistics of the school, corresponding to the death rate of the community. Through them studies may be made of retardation, shifting about in industry, the comparative mental capacity of those who drop out of school at 14 years of age, and the capacity of those who stay, and the wage-earning capacity of those who leave school at the age of 14.

The results of physical examinations point the way to revisions of health requirements in the law. The necessity of continuing cooperative and part-time classes is clearly demonstrated. Lack of correlation between wages, type of position, and school grade, as shown in certificate records, emphasizes increasingly and constantly the need of intensive study of the industry and the occupation into which the child is certificated. When a review of psychological tests reveals superior mental ability in children who are compelled to go to work, means can be developed through social agencies to give these children further opportunity for education, thus providing for those who show promise of intellectual leadership. The issuing of certificates is a work involving great responsibility; it calls for officers of high standards who have studied all phases of the subject and are capable of giving wise advice.—G. N. T.

THE ENFORCEMENT OF A PHYSICAL STANDARD. *W. Wright. U. S. Dept. Labor, Children's Bur., Pub. No. 116, pp. 53-62.*

The enforcement of standards of physical fitness is dependent, first, upon medical personnel, and second, upon the standards to be enforced. Many of the difficulties which beset the problem of medical certification of children for employment are traceable to the incompetencies of physicians. Comparatively few doctors are interested in incipient disease and probably many are incapable of recognizing it. If the purpose of state laws is to be carried out, examinations must be made by suitably qualified physicians who are provided with proper compensation for their work. Whenever possible, physicians who are interested in such work, and who have had definite training in this field, should be chosen. Trade processes are so diversified, however, that it is practically out of the question for the average physician to state with certainty that a man is physically qualified for a specified job. Many physicians in large industrial establishments who are deeply concerned with selective placement of labor applicants do not recommend the employment of personnel for specified tasks; rather, they grade the men according to a code—for example, A, for persons in excellent condition, fit for any employment within the establishment; B, for those with minor defects demanding some consideration in placement; C, for those who must be carefully placed with regard to physical condition; and D, for those rejected as unfit for employment at any work within the establishment.

Correction of physical defects observed in the course of examinations can be recommended by the physician, but many such defects seldom admit of other than palliative treatment. The time for action was at an earlier age, when school physicians should have detected the trouble. Even then, effective treatment may have been prevented by economic limitations or ignorance of the parents, or by other factors beyond public control. At the present time, the greatest value of the medical examination made as a prerequisite to the issuance of an employment certificate lies in its revelation of the inadequacies of existing mechanism for the care of the health of children of school and pre-school age in both public schools and those conducted under private auspices.

There is a rapidly growing demand among examiners in certificating offices for standards of normal limits for physical findings. Careful physical examinations and sound medical judgments are, of course, necessary, but standards of procedure and limits or normality are required to assure reasonable uniformity of judgment throughout a state or throughout the entire country.—G. N. T.

THE ENFORCEMENT OF AN AGE STANDARD. *E. L. Rider. U. S. Dept. Labor, Children's Bur., Pub. No. 116, pp. 40-48.*

The enforcement of an age standard for children who work in Alabama is complicated by the fact that the state is not in the birth-registration area. The working hours of children under 16 are restricted to eight hours a day, and to the hours between 6 A.M.

and 7 P.M.; the occupation must not be considered dangerous to the life, limb or morals of the child. Every child under 16 years of age who goes to work must have an employment certificate issued according to certain requirements. Employment certificates must bear evidence of age, and the law recognizes the following proofs in the order of their acceptability: (1) a duly attested birth record; (2) a duly attested transcript of certificate of baptism showing date of birth of child and its place of baptism; (3) a life insurance policy in force at least one year; (4) a bona fide contemporary Bible record of birth; (5) a passport or certificate of arrival in the United States showing the age of the child; (6) an affidavit of age sworn to by the parent and accompanied by a certificate of physical age signed by a public school or public health physician.

In 1922, of the 1,600 children under 16 years of age to whom certificates were issued, only 6 per cent. were able to furnish birth certificates, 1 per cent. offered baptismal certificates, 27 per cent. furnished Bible records, and 32 per cent. brought insurance certificates as evidence of age. The remaining 34 per cent. of the certificates were issued on parents' affidavits and school records accompanied by certificates of physical age.

In spite of many difficulties, the enforcement of the age standard has been reasonably successful. Some cases have called for great patience and resourcefulness on the part of the investigator, but in cases where plenty of diligence was used, the results were satisfactory.—G. N. T.

ENFORCEMENT IN MISSOURI. *A. C.-M. Wing. Am. Child, May, 1923, vol. 5, p. 3.*

When the author took charge of the Missouri Inspection Department in 1921, she found the child labor laws, such as they were, being rampantly disobeyed. Ten-cent stores were swarming with children; large department stores employed children; theaters, concert halls, and other places of amusement likewise employed them. The enforcement of the labor laws of the state has resulted in the disappearance of children from these fields of labor.—M. C. H.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

SANITATION IN THE LEAD WORKING INDUSTRIES. *Agasse-Lafont, Feil, and P. Pouillot. Abstr. as follows from Recherches et inventions, 1923, vol. 4, pp. 34-40, 56-65, in Chem. Abstr., April 10, 1923, vol. 17, p. 1290.*

A description of the manufacture of lead plates for accumulators, with a discussion of the dangers caused by dust and fumes. Report is given of a detailed study of all employees (96) in one plant (*Chem. Abstr.*, vol. 16, 2926; Heim, *Chem. Abstr.*, vol. 17, 586), and recommendations for improving sanitary working conditions are made.—P. D.

PITHEAD BATHS AND OTHER AMENITIES IN COLLIERY AREAS. *E. C. Williams. Pub. Health, June, 1923, vol. 36, pp. 241-247.*

The present condition of the coal mining fraternity in Great Britain is here described with its lack of facilities for miners to remove the sweat of toil and the color-bar of industry before returning home. Today a tired, soiled, and clammy man is exposed to outside weather when leaving work for home and on the journey to the disadvantages of being avoided in the street or on a public conveyance. At home a hard worked wife has to provide him with a hot bath taken usually before the kitchen fire in the presence of the family; for not 5 per cent. of the houses possess baths. If the pit works three shifts, there may be a member of the household in each shift and provision for cleansing in the home has to be repeated three times a day. The call for pithead baths in the interests of health, of psychology, and of housing is great.

On the continent of Europe such baths are provided. Great Britain holds back on account of the cost, but where baths have been erected their success has been complete.

The writer makes a claim that the Miners' Welfare Fund should be used for this purpose. The fund which is raised by a levy of one penny on every ton of coal raised

amounts to about one million pounds a year; the act controlling it lasts for five years. The money raised must be used for the welfare of the mining community. There is a tendency for the fund to be expended on recreational facilities, while ambulance, first-aid stations, massage centers, pithead baths and canteens, as well as other basic needs, are being somewhat overlooked.—E. L. C.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Employees' Attitude toward Medical Service. *R. E. Andrews. Nation's Health, May, 1923, vol. 5, pp. 289-291.*

The author discusses the change in viewpoint during the last few years on the part of both employer and employee toward the work of the physician in industry, until today "industry accepts medical service as the most necessary part of service which is established in the plant."

Especial emphasis is laid upon the importance in a successful industrial medical department of adopting the right attitude toward the mental state of sick or injured employees.—K. R. D.

What Industrial Medicine Means to the Plant Manager. *F. W. Dershimer. Indust. Management, June, 1923, vol. 65, pp. 379-381.*

The article is summed up in the following conclusions:

1. To be profitable to the industry, physical examinations should be made by a physician with special training in industrial medicine.

2. The purpose of the examination should be not only to reject those entirely unfit, but to fit all men to their jobs.

3. Sufficient time must be allowed for this to be done.

4. The physician's O.K. should be required for every placement and every transfer of a man from one job to another.

5. The nurse should be trained in health work.

6. She should follow up each correctable defect discovered by the doctor and make every effort to get it corrected.

7. The physician should be recognized as a department head, on an even footing with all other department heads, and should report to an equally high official.—M. C. H.

Physical Examination of Minors in an Industrial Concern. *L. G. Fiske. Pub. Health Nurse, June, 1923, vol. 15, pp. 315-316.*

While the law of Massachusetts specifies 14 as the minimum working age, it has been the policy of the Dennison Manufacturing Company to regard 16 as a minimum age in all but exceptional cases.

As a result of requiring semi-annual physical examinations for persons under 17 years of age, industrial life has less opportunity of harmfully affecting young persons. The examinations reveal striking defects of teeth, vision, weight, and posture. Of twenty-six boys examined recently only seven had good teeth. Those needing attention are directed to the dental clinic, and either are advised to make an appointment with the factory dentist or are given two weeks to have their teeth put in order by an outside dentist. All cases are followed up, and in nearly every instance it is found that the teeth have received attention. The same method is used for poor vision.

In all cases of underweight of 7 pounds or more, milk is given both morning and afternoon. Special attention is given to those with minor heart defects or lung defects. As a result of this medical attention, fewer employees are placed at jobs for which they are physically unsuited, defects are watched, and a more efficient working force results.—M. C. H.

Medical Examination of Chauffeurs. *Abstr. as follows from Bull. de l'Acad. de méd., Jan. 9, 1923, vol. 89, p. 47, in Jour. Am. Med. Assn., March 24, 1923, vol. 80, p. 878.*

The academy adopted the resolution of a committee composed of Quénu, Tuffier, Vaquez and Fiessinger, recommending the following measures with regard to issuing licenses to persons driving automobiles: (1)

The chauffeur must be without exception 20 years old. (2) No license is to be granted to persons with mental disturbances, organic lesions of the heart, vessels or nervous system. Sight and hearing must be examined by a special medical commission. Special rules must be published concerning the degree of the lesions which would make driving inadvisable. (3) Mutilated persons may drive if really able to do so with their prosthesis. (4) The driver must be re-examined after ten years or, in special cases, in three years. (5) The license should be revoked for intoxications, especially if repeated. (6) Every driver who causes an accident must be re-examined immediately.—K. R. D.

RELIABLE RECORDS IN INDUSTRIAL AMBULANCE ROOMS. *Div. Indust. Hyg., Dept. Health, Commonwealth of Australia, Service Pub. No. 23, pp. 16.*

The purpose of this publication is to suggest uniform records for Australian industrial clinics, in an attempt to make possible a reliable comparison of the experience of various clinics.

Three record forms are presented in the appendix: (1) a general monthly report: (2) a monthly analysis of lost-time cases, tabulated by departments and by age groups and sex; and (3) a monthly analysis of lost-time cases classified by disease or disorder. An international list of causes of death is appended.—M. C. S.

LESSONS DRAWN FROM THE SUCCESS OF THE INDUSTRIAL HEALTH SERVICE POINT THE WAY FOR INCREASING THE NORMAL SPAN OF LIFE. *Ohio State Med. Jour., Feb., 1923, vol. 19, p. 121.*

Dr. Otto P. Geier, Director of Employees Health Service Department, Cincinnati Milling Machine Company, made this statement: "If periodic physical examinations, daily supervision of workers and working conditions, if early diagnosis of disease contributes anything to public health, to the clearing up of physical defects and inducing hygienic living, then the training of industrial physicians becomes a vital part of any economic health program and should be reflected in the education imparted to the modern health officer."

In support of this idea, he adds:

"1. We are living in an industrial country, in the era of 'The Iron Man' with the resulting problems of health and physical efficiency.

"2. The industrial physician is the humanitarian answer of medicine to the health needs of all groups in this era.

"3. A physician devoting his whole time to the health problems of industry will deliver more units of useful surgery, of diagnosis, of curative care, of preventive medicine, of educational hygiene, both collective and individual, than can possibly occur in the private individualistic practice.

"4. Placing a physician in industry, in stores, banks, etc., makes health a part of the workaday life—adds it to the cost of doing business—puts health matters on a business basis.

"5. Consultation for diagnosis is encouraged by the industrial physician to a greater degree than by the practitioner because the industrial physician's failures stare him in the face daily; his uncured cases are advertised to all groups, including the management.

"6. The industrial physician sees the human machine under a load test. He sees it gradually get out of alignment and makes repairs before a complete breakdown occurs. Before and after an illness, he adjusts the load to the ability of the weakened human machine.

"7. In the supervising of as few as 5 per cent. of those gainfully employed the industrial physician perhaps makes more physical examinations per year where no illness is involved than are made on the other 95 per cent. of the workers. (Less than 3 per cent. of the policy holders of the Metropolitan availed themselves of the free periodic examinations offered to them. Those that did accept showed 67 per cent. reduction in mortality.)

"8. Teaching the breadwinner the worthwhileness of personal hygiene, prompt attention to minor injury and illness and the value of physical examinations, means that more money will be cheerfully spent on these same facilities for the members of the family for whom he or she provides.

"9. In case of preventable illness or accident under a system of industrial medicine

the worker blames himself for the loss of wages and knows his employer is being robbed of production. In the other case, he usually curses his 'bad luck' and feels that the physician in private practice is fattening on his God-sent misfortunes.

"10. Industrial medicine is one of the safe, sane, stop-gaps, between whatever is unsatisfactory in the present system of medicine and that much heralded socialized medicine. It supplies the economical advantages of the organized treatment of large groups, but preserves the real values of the individualistic competitive system. Our statecraft is of such low grade that we should desist from overloading our ship of state until the present political leaks are stopped.

"11. Industrial medicine now supervising perhaps 4,000,000 workers and employing the part or whole time of possibly 2,000 physicians has developed in spite of the indifference of our medical leaders toward this specialty and has attracted many good men despite the patronizing attitude of the profession at large. It has succeeded in the face of this opposition because it is economically and socially sound.

"12. The sanitarian should be the strongest proponent of the extension of industrial medicine, which is applying preventive medicine, collective and individual, in its most intense form-compelling periodic physical examination and demonstrating the value of the prompt seeking of medical attention and early diagnosis. Sanitation and the detection of contagious diseases and of sources of occupational disease add further argument to the value of the industrial physician's work, to say nothing of his ability to furnish reliable morbidity statistics covering large groups.

"13. If mortality and morbidity are to be reduced to the minimum it must be through the more direct appeal to individuals to observe the laws of personal hygiene, to avoid quacks and nostrums, and to seek the physician's aid early. If such interest be placed on an economic basis, as in industry, this program will be definitely accelerated."—M. C. H.

INDUSTRIAL PERSONAL AND COMMUNITY HYGIENE: HOUSING, ETC.

HOUSING OUR WORKERS. *J. H. McCandless. Brooklyn, March 17, 1923, vol. 4, pp. 9-10, 15.*

The author deals with the shortage of workingmen's houses in Brooklyn and states that "the only way in which we will now get the cheaper houses so greatly needed for our working people, will be by a determined campaign of construction sponsored by the industrial concerns which would be most benefited by a more contented working class. They might be built by a single industry, or by numerous industries working together in some form of housing corporation. The possibility of such a move in Brooklyn, as a result of the Chamber of Commerce study, is most encouraging."—M. C. S.

GOVERNMENT HOUSING FOR THE WORKING CLASSES IN BOMBAY. *U. S. Month. Labor Rev., April, 1923, vol. 16. p. 94.*

The *Labor Gazette*, the official organ of the Bombay Labor Office, contains in its issue for December, 1922, an account of the formal opening of the Bombay industrial housing scheme consisting of twenty chawls, or blocks, containing 1,600 tenements. This scheme is an example of a governmental enterprise in which dwellings have been constructed both more cheaply and more rapidly than was deemed possible when the original plans were adopted. The housing of the working classes in Bombay had long been a matter of public concern, but little progress was made in grappling with it until the government undertook an extensive program for the improvement of Bombay and its suburbs, which included the provision of 50,000 one-room tenements for the workers. The chawls are constructed of concrete. The design provides for a skeleton framework consisting of columns, beams, floors, and roofs, and these are poured in position. All other parts are constructed in standard sizes, and brought, ready-made, to the site. As each chawl contains eighty rooms and each room is expected to house a family, provided it does not number more than five persons, the management feels that rapid progress is being made in relieving the housing shortage.—M. C. H.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

AN INVESTIGATION IN A COAL MINE (III). *E. Farmer, S. Adams and A. Stephenson. Jour. Nat. Inst. Indust. Psychol., April, 1923, vol. 1, pp. 232-235.*

The authors describe a number of fresh observations on the output of miners who had been trained to adopt rhythmical methods in the hewing of coal. One group of men, who were tested for a forty-five-week period before training, showed a 15 per cent. improvement of output in the next thirty-four weeks, during and after training. Another group of men, who were tested for a thirteen-week period before training, showed a 16 per cent. improvement in the next twenty-eight weeks, during and after training. The experiments were made on miners of long standing, who must have found no little difficulty in changing their motor habits, and if a similar method of training were adopted in young workers, just beginning to hew coal, it is probable that far greater improvement would result.

Further observations are described on the use of miners' lamps fitted with translucent glass in place of clear glass. These lamps throw less strain on the eyes, and the miners are unanimous in their declarations that the innovation is a great improvement.—H. M. V.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

PRESENT TENDENCIES IN PERSONNEL PRACTICE. *R. F. Lovett. Indust. Management, June, 1923, vol. 65, pp. 327-333.*

This title of an article concerning a study of personnel procedure in seventy-four industrial and commercial concerns is listed for the benefit of interested readers.—M. C. H.

STUDIES IN INDUSTRIAL PSYCHOLOGY. *E. O. Bregman. Abstr. from Arch. Psychol., Sept., 1922, No. 59, pp. 9-53, in Jour. Personnel Res., Dec., 1922,-Jan., 1923, vol. 1, pp. 402-403.*

This paper treats of tests for general or special abilities, the latter part dealing with special abilities of sales clerks and clerical workers in a large department store. Two scales for measurement of general ability are given, and methods for guarding against employment of the dull and defective are suggested. The place of the psychologist in industry is discussed, two possible forms of work being the creation of personnel and production records, and the evaluation of reliable tests.—G. N. T.

THE SCOTT COMPANY GRAPHIC RATING SCALE. *D. G. Paterson. Jour. Personnel Res., Dec., 1922,-Jan., 1923, vol. 1, pp. 361-376.*

This article describes the development, uses, and results of the Graphic Rating Scale and takes up the safeguards necessary in applying it. The scale is outlined in considerable detail. It was found to be highly reliable and simple enough for practical use. It has two chief features not brought together heretofore. One is that the person who is making the judgment is freed from direct quantitative terms in making his decision of merit in any quality. The other is that the person making the judgment can make as fine a discrimination of merit as he chooses. In general, close agreement between foremen concerning their workers was obtained. Where differences in rating tendencies occurred methods were worked out for interpreting the results correctly. No instances of objection to the use of the scale were noted either from superiors or from subordinates. In individual cases, foremen, executives, and workers testified to its value.—G. N. T.

A METHOD FOR CLASSIFYING THE JOBS AND RATING THE EFFICIENCY OF CLERICAL WORKERS. *M. A. Bills. Jour. Personnel Res., Dec., 1922,-Jan., 1923, vol. 1, pp. 384-393.*

This article describes an experiment in job classification, personnel rating, and salary adjustment in a clerical force of about 300 people. As in most clerical forces there had been, previous to this, little standardization and no definite system of determining efficiency. Four fundamental principles were

observed. First, a description of each job was carefully written; second, the jobs were classified into levels according to the degree of difficulty of the work; third, a maximum and minimum salary was determined for each group of jobs; and fourth, the efficiency of the worker determined his position between the maximum and minimum salary.

The experiment resulted in about 200 increases in salary. About eighty decreases were indicated but not made. The company accepted the arrangement as fair. The clerks felt that they were being paid on a well-considered basis for the work done. A basis for system work was laid that can be carried on later. Definite lines of promotion throughout the company were indicated. Transfers from one department to another were facilitated. It has thus been demonstrated that there is a logical classification of clerical work that is practicable.—G. N. T.

Analyzing Ratings and Training Raters. *F. A. Kingsbury. Jour. Personnel Res., Dec., 1922-Jan., 1923, vol. 1, pp. 377-383.*

This article discusses a rating-scale investigation undertaken in a large national bank. Ratings had been made of about 450 employees by forty-five department managers. These ratings disclosed, among other things, lack of time and care, and failure to appreciate the importance of the work. Biased ratings were frequent and standards were far from uniform. An intensive analysis revealed as much about the rater as about those whom he rated, if not more; and by revealing the nature of common errors or individual misunderstandings and failures it made possible a program for training in making more reliable ratings. A revised scale was devised and plans were made for the preparation of a rater's manual, conferences of raters for clearing up misunderstandings, and intensive practice in rating until reliable results could be obtained.

The writer well says, "The problem of ratings is only in part one of scale and administrative technique. Reliability of ratings depends upon, and always must depend upon, the intelligence and care with which each individual rater observes the activities and product of each individual employee, the deliberateness and impartiality with which he generalizes upon his observations and checks them by further observation, and the care with which he records his judgments on the device provided."—G. N. T.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Workmen's Compensation. *Donahey. Ohio State Med. Jour., Feb., 1923, vol. 19, p. 73.*

In his message to the Eighty-Fifth General Assembly of Ohio on January 9, Governor Donahey made some pertinent comments upon the Workmen's Compensation Act and Industrial Rehabilitation, which are of considerable interest to the medical profession.

"When Ohio passed the workmen's compensation law, it obeyed the highest dictates of humanity and it also relieved a great public evil by alleviating discontent in society. Ohio has made such wonderful success in the administration of the state insurance feature of the workmen's compensation law that it has attracted the attention of the entire world. There are, however, some improvements that should be made. Claims should be adjusted with more speed so that payments of compensation may reach claimants with less delay. The industrial commission has never had a force sufficient to accomplish this. I suggest that you give earnest attention to this question and take such action as will bring prompt and adequate relief to the unfortunate victims of industrial accidents and occupational diseases."

"The idea of broadening the scope of the occupational disease feature of the workmen's compensation law should be considered. Industry should not bear any burden for which it is not responsible but the law should be broad enough to cover any disability or death that results from conditions imposed by industry."

Emphasis was placed upon the fact that the financial cost of industrial accidents to

employers and employees can be materially reduced by a state planned system of rehabilitation for industrial workers. Donahey emphasized the need for general consideration on all legislative proposals of a radical or paternalistic nature, and urged the use of referendum for such measures as affect the general welfare of the people.—M. C. S.

THE MEDICAL OFFICER AND THE EMPLOYEES' COMPENSATION ACT. *J. C. Pryor. Mil. Surgeon, Feb., 1923, vol. 52, pp. 131-139.*

The Federal Employees' Compensation Act of September 7, 1916, imposed new duties upon officers of the Army, Navy, and Public Health Service. They are required to furnish reasonable medical, surgical, and hospital services to civilian employees when practicable and to keep the customary records on which applications for compensation must be based. The duties thus imposed are diverse and make work correspondingly difficult. The personnel dealt with is of a different quality from that encountered in the service, and the officer must familiarize himself with industrial processes which normally do not concern him. A consideration of the problems encountered with a view to preventing injury or disease leads to an analysis of two factors—environment and the individual. A study of environment calls attention to the necessity of hygienic working conditions with respect to air, light, water, handling of heavy objects, electricity, steam, poisons, machinery, and industrial processes. A study of personnel problems brings out the fact that 75 per cent. of accidents causing injury are due to carelessness. The tactful investigator must determine whether this is due to fatigue, illness, home-worry, drink dissipation, or sheer indifference. Where the services of a specialist are needed after injury it is the duty of the medical officer to call one into consultation, usually with the prior approval of the Compensation Commission, and to certify his bill for payment. The medical officer is also required to fill out the "attending physician's statement" on the application of the injured employee for compensation. He must also examine and report from time to time the exact status of persons drawing continuing pay for disability. It is the author's belief that the adoption of a system of an annual bonus to foremen in shops, with a fixed reduction for each accident occurring to those under their supervision, would have beneficial results. He emphasizes the fact that money is better spent on accident and injury prevention than upon compensation. —G. N. T.

NEUROLOGY AND INDUSTRIAL MEDICINE. *G. F. Boehme. Am. Physician, April, 1923, vol. 28, pp. 244-246, 258.*

This article discusses the problem of traumatism, real and alleged, involved in industrial compensation work. The author urges that neurologists consider probabilities, not vague intangible possibilities, and that they render good, logical, pragmatic conclusions. Cases are cited where the question of traumatism was raised, although no traumatic lesion was shown and other reasons were sufficient to explain the condition. Bad neurological or medical advice often leads to unconscious malingering, and some conditions, as traumatic neuroses, are produced too frequently in the minds of patients by an avaricious medical attendant united with an anxious family, meddling neighbors, and an unscrupulous attorney. It is a part of the neurologist's duty to aid in removing fear, not to fix abnormal psychic states. Reports to commissions, committees, and insurance carriers should present a definite diagnosis besides the routine so-called complete statement of facts. The most probable conclusion should be given unweakened by a statement of all kinds of possibilities. Tangible, well-judged estimates of the amount and character of disability should be made. The question of compensability should be considered, and a fair, well-crystallized opinion rendered. Insurance companies, employers, and industrial accident commissions all want the truth.—G. N. T.

HERNIA FROM THE EMPLOYER'S STANDPOINT. *R. J. Graves. Boston Med. and Surg. Jour., March 29, 1923, vol. 188, pp. 454-455.*

The rapid increase in the amount of payments on account of hernia cases has been one of the chief sources of personal injury expense to industry in general, and particularly to the railroads. Hernia, especially oblique inguinal, is seldom if ever, due to a single shock or blow, but is a matter of slow

development over a considerable period of time. This fact, while upheld by the mass of authorities on the subject, is not admitted by a large group of physicians, compensation boards, and laymen.

The Medical and Surgical Section of the American Railway Association has adopted the following position on the subject: True traumatic hernia is a very rare condition. Hernia is practically always due to the pressure of a preformed sac or open pouch of peritoneum, to which is often added the presence of structural weakness in the neighborhood of the hernial orifices. To establish a claim for compensation for hernia, the claimant should be able to demonstrate the following conditions: The hernia must appear suddenly; it must be accompanied by pain and tenderness; it must immediately follow some adequate accident; and there must be proof that it did not exist prior to the accident.—B. C.

Compensation for Typhoid Fever under Workmen's Compensation Act. *U. S. Pub. Health Rep., June 8, 1923, vol. 38, pp. 1272-1273.*

Typhoid fever contracted by an employee of a hotel as the result of drinking impure well water furnished by the hotel has been held compensable as an accident within the meaning of the Workmen's Compensation Act by the Supreme Court of Michigan.—B. C.

REHABILITATION OF DISABLED EMPLOYEES

Rehabilitation as the Next Step. *S. S Riddle. Penn. State Dept. Health., Nov., 1922, vol. 1, pp. 18-22.*

The Pennsylvania Rehabilitation Act contemplates the return of a severely injured person to a task suitable to his disability. Economic relief during the period of training is essential. This is provided under the Workmen's Compensation Act in many cases, although workers injured in agricultural pursuits are excluded.

Co-operation between the Rehabilitation Bureau and the Workmen's Compensation Bureau has brought about good results in returning disabled persons to industry. It often happens, however, that pending litigation delays compensation payments or that the rehabilitation cannot begin until after compensation has ceased. In such cases, the Rehabilitation Bureau must make every effort to help the injured person either through the use of its own funds or through other relief agencies.

Under the law, the Bureau may not use its own appropriation funds for hospital care, but it has arranged with various state-aided hospitals to provide for worthy cases. Cooperation between the Bureau and the compensation carrier, in the case of a person eligible to compensation benefits, often results in additional necessary therapeutic treatment, particularly where the compensation award is based on percentage of disability rather than on difference in earning power. Industrial clinics for the treatment and functional restoration of partially disabled persons are being developed in state hospitals and by groups of employers, insurance carriers, and public or philanthropic agencies. The line of cleavage between physical and vocational rehabilitation remains indistinct, some authorities holding that compensable cases should come under the workmen's compensation system throughout both stages.—G. N. T.

Earning Capacity of the War Disabled. *Gourdon et al. Abstr. from Bull. de l'Acad. de méd., Jan. 30, 1923, vol. 89, p. 177, in Jour. Am. Med. Assn., March 31, 1923, vol. 80, p. 963.*

Gourdon reports the results of re-education of soldiers who were mutilated or became sick during the war. The results are better in those who were injured (earning capacity of 90 per cent.).—K. R. D.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

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GENERAL

LEAGUE OF NATIONS UNION. INTERNATIONAL LABOUR ORGANIZATION AND INDUSTRIAL HEALTH. NOTES ON A RECENT CONFERENCE IN LONDON. *W. F. Dearden.*

That there exists in the minds of most people considerable confusion as to the actual constitution and real function of this offshoot of the League of Nations is undoubted, and, furthermore, there is reason to believe that many of those who are better informed as to its objects have but hazy notions respecting the details of its activities. It was therefore a happy inspiration on the part of the League of Nations Union of Great Britain to induce representatives from associations and other authoritative bodies interested in promoting industrial health and safety to meet in conference with accredited representatives of the International Organization itself. The aim of this conference was to bring about, by means of discussions and explanations, a better understanding of the work carried on in Geneva and of the ways and means by which the efforts and objects of the bodies particularly interested can be materially assisted by a co-ordinating center.

The meetings took place on June 19 and 20, at the Royal Sanitary Institute, Buckingham Palace Road, London. Among the members of the medical profession present at the various sessions were Sir Thomas Oliver, Dr. J. C. Bond, Dr. W. F. Dearden, and Dr. Alfred Cox, representing the British Medical Association; Dr. D. McKail, Dr. T. Watts, M.P., and Dr. W. H. F. Oxley, representing the Association of Certifying Factory Surgeons; Dr. T. M. Legge, Prof. E. L. Collis, Col. Fremantle, M.P., Dr. C. S. Myers, Dr.

Winifred Cullis, Dr. Robertson (Melbourne), and Dr. R. Legge (University of California). The scheme devised by the promoters was to select four principal industrial health problems for discussion; to have these introduced by well-known British experts; to bring out under each heading the way in which the International Organization could be useful. Mr. H. A. Grimshaw, one of the chiefs of the Diplomatic Section of the Central Office, was present at all the sittings and, in the course of discussion as well as in a preliminary address, very ably fulfilled his particular task of making the position of the International Organization quite clear. He pointed out that this body was not an amalgamation of Trade Unions or Soviets, but held place as a well-defined unit in the League of Nations constitution established by the Treaty of Versailles. Its function was to secure by international action the adjustment of conditions of labor throughout the world to the requirements of justice and humanity; its constitution was made up by membership of subscribing states, at present fifty-four in number. At periodical conferences to which each state sent four delegates—one representing employers, one representing workers, and the other two directly representing the government concerned—draft conventions were formulated, recommendations with a view to co-ordinating legislation in member states were drawn up, and scientific commissions of investigation were appointed. He explained how the permanent staff at Geneva collected information from all quarters, both for the purposes of the conferences and for the use of subscribing states, and added that much of this information would be available to properly accredited associations who cared to make application. He also intimated that the magnificent library of the organization would be at the service of any properly accredited representatives of such associations visiting Geneva.

The proceedings on the first day were opened by Mr. W. L. Hitchens, Chairman of Cammell Laird & Co., with an explanation of the objects of the conference. After some further explanations by Mr. Grimshaw, Mr. J. H. Thomas, M.P., in the course of a very practical speech, said that want of confidence and a mutual suspicion of each other exhibited by both masters and men created most of the difficulties in industrial life, and that he cordially welcomed a scheme which provided for both sides sitting down together to hammer out solutions for labor problems on an international basis. Lt. Col. J. A. A. Pickard, of the Safety First Association, opened a discussion on safety and protection in industry, and was followed by Mr. G. S. Taylor, Senior Engineering Inspector of the Factory Department, who dealt with the safeguarding of machinery and the necessity of collecting the experiences of various countries before action could be taken on international lines. Mr. W. Graham, M.P., Chairman of the Industrial Fatigue Research Board, presided at the afternoon sitting, when a discussion on industrial fatigue was introduced by Mr. D. R. Wilson, the Secretary of this Board, and Dr. C. S. Myers, Director of the Institute of Industrial Psychology, the former expressing the view that work on this subject undertaken in different countries should be co-ordinated by exchange of information. Dr. T. M. Legge, Dr. Robert Legge, Sir Thomas Oliver, Dr. Bond, and Dr. Winifred Cullis also spoke.

The first subject discussed on the second day was industrial disease and injurious processes, Dr. T. Watts, M.P., occupying the chair. Dr. T. M. Legge, Senior Medical Inspector of Factories, in introducing the subject, illustrated the importance and value of possessing knowledge of the most minute details of industrial disease and poisonings by experiences during the war, and gave credit to the work of certifying surgeons for the marked improvement in the health and physique of the working classes in Lancashire. Professor Collis showed that industrial health was concerned with workers in mines, in agriculture, on railways, and in offices, as well as with the factory operative, and that information from other countries respecting these various branches of industry would be extremely useful, an illustration being provided by the known superior provision of pithead baths abroad. Dr. Dearden spoke on the recommendations of the international body for universal establishment of government industrial medical service, and demonstrated how insufficient for its full purpose was the service provided in Great Britain. Dr. Fremantle illustrated the value of contemporary knowledge by his experience of vertical hot water baths in Japan, and Dr.

McKail, referring to a recommendation for universal notification of industrial diseases and poisonings, suggested that the list of those notifiable in Great Britain was very much in need of revision. The chairman emphasized the need for a wider knowledge respecting color vision tests for engine drivers, pointing out that, in his own experience as a Railway Medical Officer, he had known men rejected on color tests who were able to read the different road signals perfectly. The afternoon meeting, under the chairmanship of Miss Margaret Bondfield, considered the question of the health of women workers. Miss Constance Smith (Deputy Chief Inspector of Factories) provided the opening paper. The question of maintenance being provided, by employer or insurance, for married women during absence before and after confinement was discussed.

Though no resolutions were brought forward, there appeared to be no doubt that the Conference was much impressed with the present and future usefulness of the International Organization.—W. F. D.

MEDICINE AND LABOUR. *L. Carozzi. World's Health, April, 1923, vol. 4, pp. 1-4.*

The author emphasizes in a general way the need of the physician for a special understanding of industry in order to comprehend the workingman. He appeals to the workingman for his co-operation.—M. C. H.

CAUSES OF ABSENTEEISM AMONG STORE WORKERS. *C. A. Swan. Nation's Health, March, 1923, vol. 5, pp. 163-164.*

The author discusses the causes of absence in a mercantile establishment having about 15,000 employees. Figures for a period of six months (from March 1 to August 31) show a striking predominance of acute upper respiratory infections as a cause of absence (39.4 per cent.). Although 65 per cent. of the employed were women, dysmenorrhea was the cause of only 7.2 per cent. of the absences. Injuries, including those incurred at home, caused only 4.8 per cent. of the absences. The curve of seasonal variation in absences showed its peak in February, with the lowest level in July.

A study of the relation between sex and absenteeism showed that the women had an absence rate over two and one-half times that of the men, and that the married women were absent 58 per cent. more than the unmarried. The explanation which the author offers is that the women are more susceptible to all types of illness than the men, and that they are more likely than the men to consider minor illness as sufficient grounds for absenting themselves from work.

The absence rate among the older employees was 41 per cent. higher than among the juniors (largely under 19 years). Class A employees (those in good health with no defects of any importance) showed an absence rate 12 per cent. lower than Class B employees (those with minor defects, but able to undertake any type of work), and 42 per cent. lower than Class C employees (those with more serious defects).

An attempt to differentiate between preventable and unpreventable causes of absence showed that in six months, out of 3,000 days of absence, about 600 were due to unpreventable causes. The author emphasizes the importance of the attitude of the individual toward bodily discomfort as a factor in causing absence.

Efforts to reduce absenteeism should concern themselves with the prevention of illness and of injuries, and with the improvement of the physical condition of the employees.—K. R. D.

OCCUPATIONAL DISEASES OF RICE CULTURE. *P. Sangiorgi. Abstr. from Rif. Med., 1923, no. 12, in Il Lavoro, March, 1923, vol. 14, pp. 89-90.*

The author reports the following diseases among workers engaged in rice culture:

Dermatitis localized in the legs and arms from continual immersion in water.

Gastro-intestinal disturbances due partly to the mode of living, lack of proper drinking water, posture, and loss of heat due to immersion in water.

Female pelvic organs are affected by the poor hygiene, fatigue of the work, climate, surroundings, and posture.

Eye troubles caused by injury to the cornea, and conjunctival hyperemia from solar reflection from the water.

In addition the author found various other somatic conditions which he considered were caused by the work. He recommends by way of prevention organized discipline among the

workers with instructive talks on the hygiene of their work.—J. W. S. B.

THE TWELVE-HOUR SHIFT. *C. R. Walker. Am. Labor Legis. Rev., June, 1923, vol. 13, pp. 108-118.*

Those who seek authoritative information on the twelve-hour day will do well to read this article. It is written by the present editor of the *Atlantic Monthly*, who was at one time a worker in a steel mill. He kept a careful record of what he saw, felt, and heard, and his conclusions are given in a thoroughly impartial spirit.

Usually not all of the twelve hours are occupied in work. From three to five hours are spent recuperating from the effects of heavy toil and in watching the furnaces. Nevertheless, the time is not the man's own, and the noise and strain of the mill are ever present. Frequently there are runs of heavy work that necessitate continuous labor for fourteen hours without respite. The nature of the work and the conditions of extreme heat and danger under which it is conducted react inevitably on the worker's health, sapping his vitality and rendering him less alert for his personal safety. The men, with few exceptions, have a deep-seated hatred of the twelve-hour shift and are anxious for a reduction in hours even at the sacrifice of earnings. They have little or no time for family life, politics, the library, or the church. There is a definite tendency for such laborers to become floaters, seeking recreation in an occasional debauch, rather than settling into good citizenship and family responsibility.

The Federated American Engineering Societies have made a careful investigation and have indorsed the three-shift system as being more efficient and humane than the twelve-hour shift. The latter still persists, nevertheless, not only in the plants of the U. S. Steel Corporation but also in those of the independent steel producers who comprise 60 per cent. of the industry. It is the writer's opinion that, in spite of protestations of reform, nothing will be done to remedy conditions until an aroused public opinion forces a change. The engineering and accounting data for accomplishing a gradual and economical passage from two shifts to three are available. A rigorous program of education to crystallize public opinion is now necessary.—G. N. T.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

ON THE DETECTION OF BENZENE IN CADAVERS. *A. O. Gettler. Jour. Pharmacol. and Exper. Therap., April, 1923, vol. 21, pp. 161-164.*

In the analysis of cadavers only very small amounts of benzene may be recovered. This amount is soluble in the volume of water that comes over with the benzene during distillation, and as definite tests for benzene in dilute aqueous solution have been lacking, very little work on the detection of benzene in cadavers has been accomplished. This article gives a case, with laboratory findings, that is of importance in medico-legal work. The procedure for analysis of the organs is described in detail. Results are arranged in tabular form. Death had been caused by inhalation of benzene fumes in a garage. It was found that the liver, brain, blood, heart, and lungs contained benzene in measurable quantity, the brain having the greatest amount. No poison was found in the stomach contents, intestinal contents, or kidneys; a trace was detected in the fat and spleen.—G. N. T.

ERRORS IN DIAGNOSIS OF LEAD POISONING. *Schwarz and Hefke. Abstr. as follows from Deutsch. med. Wchnschr., Feb. 16, 1923, vol. 49, p. 212, in Jour. Am. Med. Assn., June 2, 1923, vol. 80, p. 1656.*

Schwarz and Hefke agree with P. Schmidt on the four cardinal symptoms for early diagnosis of lead poisoning: complexion, border of gums, basophilic stippling of erythrocytes, and hematoporphyrin in urine. As a preliminary examination of blood, the "thick droplet" is useful.—K. R. D.

THE RETENTION AND ELIMINATION OF LEAD. *J. C. Aub and A. Minot. Proc. Am. Soc. Clin.*

Investigation, Jour. Am. Med. Assn., June 2, 1923, vol. 80, p. 1643.

"After lead has been absorbed through the gastro-intestinal or respiratory tracts, it is stored nearly completely in the calcareous portion of the bones. Here it remains normally for long periods, with the gradual release of only small amounts. In one group of animals the esophagus was tied and lead carbonate was introduced directly into the lungs. The animals were given physiologic sodium chlorid solution intraperitoneally. When the animals were killed, within eighty hours after the injection, nearly all of the absorbed lead was found in the bones. In animals allowed to live between eighty and 160 hours, only about 81 per cent. of the lead was found in the bones. When sodium bicarbonate instead of salt solution was injected intraperitoneally, the amount of lead found in the bones did not diminish, but remained at 94 per cent. of the total absorbed lead. This strongly suggested that the reduction of the alkali reserve allowed the liberation of lead from the bones. We next found that in leaded cats starvation will cause the lead to become distributed throughout the organism and be excreted with increased rapidity. Ingestion of large amounts of phosphoric acid has a similar but more marked effect. Using these observations in treating lead poisoning in man, we have found that ingestion of acid causes a markedly increased excretion of lead by the urine and feces. Phosphoric acid is the most effective method so far found. It is more efficient than potassium iodid, and causes a fourfold increase in the rate of lead excretion over that occurring without treatment.

"These experiments explain how distortion of the acid-base equilibrium may liberate lead from the bones long after its absorption; they explain why lead poisoning is a chronic disease with possible late acute manifestations, and they offer a new method for increasing or decreasing the excretion of lead." —K. R. D.

ARTIFICIAL PRODUCTION OF CANCER IN LUNGS FOLLOWING INTRABRONCHIAL INSUFFLATION OF COAL TAR. *N. Kimura. Abstr. as follows from Japan Med. World, March, 1923, vol. 3, p. 45, in Jour. Am. Med. Assn., May 26, 1923, vol. 80, p. 1545.*

The intrabronchial insufflation of coal tar in a rabbit, killed on the eightieth day, caused an adenoma-like growth in the lung. In a guinea-pig, which had survived for 140 days, there occurred an over-production of the bronchial epithelium, which often penetrated the wall and finally made its way into the peribronchial tissue.—K. R. D.

THE CAUSATION OF PHOSPHORUS NECROSIS. *Budapest Letter. Jour. Am. Med. Assn., July 14, 1923, vol. 81, p. 152.*

At the meeting of a provincial medical society, the causation of phosphorus necrosis was discussed. The majority of the members concurred with the English theory that the fumes of the lower oxide of phosphorus, given off from the moist phosphorus paste in the course of manufacturing matches, act locally. The other members regarded the maxillary necrosis as a local manifestation of a general disturbance. At the close of the discussion it was concluded that both views are partly correct and that caries of the teeth is a necessary factor in exciting the acute local necrosis, but that the phosphorus fumes exert no specific action on exposed bone or periosteum. There must be some systematic predisposing influence from a primary infection of the tissue as an adjunct to the local irritation. This explanation places the local irritation in a secondary position as an exciting cause. This contention is borne out by the comparative frequency of the occurrence of spontaneous fractures of the long bones in match-makers of many years' standing, and the brittle condition of the bone assuredly accounts in some degree for the low resistance of the jaw to local inflammatory injury. Further, the bone of a match-maker and healthy bone show a distinct difference in the relative proportions of phosphoric acid to lime; this is observed also in cases of "phossy jaw," as it is called in England. By the aid of the roentgen rays it can be clearly demonstrated that bone formed in young persons while working in factories in which phosphorus is used is much denser than it would otherwise be.—K. R. D.

PHARMACOLOGY OF CADMIUM AND ZINC WITH PARTICULAR REFERENCE TO EMESIS. *E. W. Schwartze and C. L. Alsberg. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., Feb., 1923, vol. 21, p. 1, in Jour.*

Am. Med. Assn., April 21, 1923, vol. 80, p. 1175.

Schwartze and Alsberg state that in the case of animals that vomit, such as cats, the chief effect of the oral administration of cadmium and zinc salts is emesis, which is dependent on the concentration in which these substances are present in the gastric contents. This local effect varies with the character of the food, being more powerful when the metals are administered in diets of liquids than when administered in those of raw hashed, lean meat. The consumption of an average-sized meal of raw hashed meat containing from 350 to 400 parts per million of cadmium or 3,000 parts per million of zinc is almost always followed by emesis. Cadmium calculated as the metal is eight to nine times more effective as an emetic than zinc.—K. R. D.

CHRONIC INTOXICATION BY SMALL QUANTITIES OF CADMIUM CHLORIDE IN THE DIET. *C. O. Johns, A. J. Finks, and C. L. Alsberg. Jour. Pharmacol. and Exper. Therap., Feb., 1923, vol. 21, pp. 59-64.*

Various concentrations of cadmium chloride were incorporated in a diet which was known to be adequate for the normal growth of rats. Diets containing from 1,000 to 62.5 parts per million of cadmium were tested. Very little or no growth occurred and death ensued when the concentration of cadmium was 1,000, 500, or 250 parts per million. When there were 125 parts per million of cadmium in the diet, the initial rate of growth was normal. All of the male rats receiving this concentration of cadmium died in about fifty days, while the majority of the females survived a very much longer time, one of them dying at the end of 190 days, while another was still living at the end of 280 days when the experiment was discontinued. A concentration of cadmium of 62.5 parts per million had no effect on growth, the rate of growth and food intake being normal. The food intake increased as the concentration of cadmium in the diet was decreased. Whether the interference with growth was due solely to the diminished food intake was not determined. With a dosage of 0.56 mg. of cadmium per day no cumulative action was observed.—M. C. S.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

REPORT OF MINERS' PHTHISIS MEDICAL BUREAU FOR 1921. *Government Printing Office, So. Africa.*

This report adds another to the interesting series dealing with the great effort which is being made in South Africa to bring silicosis and tuberculosis under control in the gold mines of the Witwatersrand. Again the director of the medical bureau is able to report that an enormous reduction has taken place in the prevalence and production of silicosis. Initial examinations were established in 1916 of all men desiring employment; no case of silicosis has occurred among 4,111 men who were passed as fit and undertook underground work, and only six cases of pulmonary tuberculosis.

Cases continue to occur, however, among miners engaged before 1916, and, during the twelve months now reported upon, forty-four cases of simple pulmonary tuberculosis and 448 of simple silicosis were detected among a total personnel of 13,682.

The medical bureau aims at eliminating from the mining personnel all persons with tuberculosis, since experience has shown that when it occurs in combination with silicosis the condition is far more serious than when either disease occurs alone; thus at the end of the first year after diagnosis, 27 to 58 per cent. of the persons with tuberculosis plus silicosis had died, but only 12 to 17 per cent. of the workers with simple tuberculosis, and 3 to 7 per cent. of those with simple silicosis; at the end of the second year the respective mortalities were 48 to 59 per cent., 25 to 31 per cent., and 6 to 10 per cent.; and at the end of the third year 70, 40 and 15 per cent., respectively.

Periodical examinations take place every six months, when any person with tuberculosis is suspended and granted compensation;

persons with silicosis are allowed to continue at work, but may accept compensation and leave.

The report, which is prepared for the lay public rather than for medical readers, contains a mass of statistical information with regard to the work carried out, the age and origin of the miners, their legal state with regard to compensation, and so forth.

One matter of medical interest is reported —*i.e.*, that investigation failed to disclose any undue incidence of nephritis among the miners, which might be expected according to the experimental work of Gye and Purdy on the toxicity of silica. The evidence on this point fails to agree with indications drawn from the mortality statistics of sandstone masons and others exposed to silica dust in Great Britain.—E. L. C.

Tuberculosis amongst Employees in Tobacco Factories. *World's Health, Feb., 1923, vol. 4, p. 30.*

In 1921 the Swedish National Anti-tuberculosis Society carried out a systematic medical examination of employees in tobacco factories. The examinations were made by ten specialists, and formed part of an industrial hygiene investigation into various trades, organized by Dr. Gottfrid Thorell.

Isolated investigations had already been carried out in 1899 and in 1905, and the results seemed to point to employees in tobacco factories as being the most subject to tuberculosis, after printers and bookbinders.

In order to complete these investigations, arrangements were made so that as little of the workmen's time as possible was lost and an effort was made to arouse their interest. From 84 to 98 per cent. submitted to examination. A distinction was made between the workmen actually handling the tobacco and those engaged in subsidiary work, such as box-makers, pasters, and machine-operators. Two other categories were also separated: employees working in the open air, and those working in factories. Finally, the cases of tuberculosis were tabulated in three groups: active pulmonary tuberculosis, arrested pulmonary tuberculosis, and doubtful cases.

In conclusion, Dr. Thorell declares that it is incorrect to state that employees in tobacco factories are more affected by tuberculosis than are workmen in other trades.

The report also includes the results of similar investigations undertaken in other countries: for instance, that made at Jakobstad in Finland in 1918, the studies of Drs. Brauer and Walther de Bade, and the investigations of insurance companies in Austria, as well as examinations carried out in England, France, and America, all of which arrived at approximately the same conclusion.—M. C. H.

Tuberculin Skin Reaction in Sulphur Workers. *A. Cammarata. Il Lavoro, May, 1923, vol. 14, pp. 129-131.*

Surprised at the rarity of tuberculosis in sulphur workers, the author undertook a number of skin tests. Of thirty sulphur workers tested twenty-nine had a marked reaction, and one was negative. A number had tuberculous relatives. All were markedly emphysematous. The author feels that emphysema with resultant increase of carbon dioxide in the blood produces an unfavorable field for the growth of tubercle bacilli in persons potentially tuberculous.—J. W. S. B.

Trauma and Joint Tuberculosis. *Abstr. as follows from Prog. Méd., Sept. 23, 1922, p. 448, in Am. Rev. Tuberc., June, 1923, vol. 7, pp. 112-113.*

In a case, seen June 11, there is a history of an accident on February 28. Work was not interrupted until April 14. The physician of the insurance company saw at that time a hydrarthrosis which no longer exists; improvement in other respects is marked. The probability is in favor of a lesion due to congenital syphilis or to tuberculosis. Admitting, with reservations, that it is tuberculosis, this was revealed but not aggravated by the accident, if there was one. The evolution during four months, with a hydrarthrosis at the end of six weeks which has since been absorbed, is the ordinary evolution of benign tuberculous arthritis of the knee in its synovial form. On March 17, the second subject fell while unloading a truck; there was pain, rapid swelling and hemarthrosis. On April 22 resection was done; synovial papillae of tuberculous nature were found, and a superficial erosion of the femoral condyles. Recovery was good. This case is probably one of those in which a latent tuberculous synovitis serves as substratum to certain hematoses which are at first purely traumatic. The synovitis surely preexisted,

since the lesions observed at the end of a month were certainly more than a month old. But aggravation by trauma, if not certain, is at least impossible to deny; hence the accident should be judged responsible. However, a subsequent recurrence of trouble must be imputed, not to the accident, but to the natural evolution to which such synovial tuberculosis is liable. In the third case a slight contusion which did not prevent the subject from working for five days was followed eventually by tuberculosis of the knee. But the knee has been cared for by massage and mobilization, and improvement was rapid as soon as immobilization with compression was begun. The diagnosis, therefore, was tuberculosis revealed by the accident and aggravated, not by it, but by improper treatment. —M. C. H.

Hookworm Di-ease as Related to Industry in Australia. *W. A. Sawyer. Am. Jour. Trop. Med., May, 1923, vol. 3, pp. 159-176.*

An investigation was conducted of mining and tilling the soil, since these are the kinds of work most likely to favor the spread of hookworm disease in Australia and her island territories. Among the many mines examined the only ones definitely shown to be spreading hookworm disease were the Ipswich and the Burrum groups of coal mines in Queensland. The effects of the disease were judged partly by the amount of anemia, as shown roughly by the hemoglobin percentage according to the Tallqvist hemoglobin scale, and partly by a determination of the number and species of worms present. Experience shows that the larger the average number of worms and the higher the proportion of hookworms of the species *Ankylostoma duodenale* to those of the species *Necator americanus*, the greater the injury to health. It is suspected, although not definitely proven, that a high content of dissolved mineral salts in some mine waters tends to inhibit the development of hookworm larvae in mine earth. It is believed that the disease can be readily controlled by simple regulations providing for sanitary underground latrines and preventing miners from working with bare feet or leaky boots.

Hookworm disease in Australia cannot in general be classed as an industrial disease related to tilling the soil. It is true that there are abundant records to prove that it is a rural disease. The fact is, however, that most adults wear boots while at work, and consequently are protected; the disease is most prevalent among children who go barefoot. Practically every home has a latrine of some sort, which helps to limit the spread of infection.

The most important single factor in the localization of hookworm disease in the Australian tropics and subtropics has been the variation in the amount of rainfall, for hookworm disease practically disappears from the Australian white population where the average annual rainfall is less than 40 inches. —G. N. T.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Occupational Dermatitis (Dolomite). *Tr. Pittsburgh Dermat. Soc., Arch. Dermat. and Syph., July, 1923, vol. 8, p. 118.*

The following case was reported at this meeting by Dr. Hollander:

J. C., a man, aged 49 years, American, a furnace worker, presented symmetrically distributed areas of chronic dermatitis occurring on both hands, forehead, neck, both feet and anterior portion of the thighs. The lesions began on the feet about three years ago and involved the rest of the areas within six months. The lesions were circumscribed, indurated and composed of papules and fissures. Because of their chronicity, pigmentation was present. The lesions were very itchy. The patient presented a burn on the nose simulating a roentgen-ray burn, which was caused by hot steel splashing on his face. The lesions on his thighs were different as they were follicular infections at about the level where the intense heat of the furnace hit his legs.

In the discussion which followed, Dr. Jacob said that he had seen this man about three times. He was unable to elicit any history of close contact with dolomite. Several other patients from the same mill were also seen by him, and in none of them was he satisfied that

dolomite was the cause of the condition. This case showed severe seborrhea of the scalp at that time, and he thought the condition was all of that nature. The further history obtained by Dr. Hollander would seem to disprove this, however. He remarked that the patient said that he did not work for six months last year, and that the eruption was much more severe then than it was when he was working in the mill. This made it appear that there must be some other irritant beside the dolomite causing the dermatitis.—M. C. S.

LACQUER DERMATITIS. *W. A. Pusey. Arch. Dermat. and Syph., Jan., 1923, vol. 7, pp. 91-92.*

A man came to the writer suffering from an acute papulovesicular dermatitis, evidently caused by an external irritant. Poison ivy was suspected, and treatment with wet dressings of aluminum acetate solution effected a quick recovery. The same man came again later, however, with the same trouble. The dermatitis on his forearms and hands was acute but not intense, consisting chiefly of discrete inflammatory lesions. The writer's assistant, Dr. Weber, investigated and demonstrated that the irritation was caused by Japanese lacquer. The man had been engaged in selling small canes. An alcoholic solution of the varnish from one of these canes was used in cutaneous tests and was found to produce large inflammatory wheals which appeared in four minutes and did not subside in three-quarters of an hour. Control tests with alcohol alone were negative.

Lacquer is made from the Japanese lacquer tree and has long been recognized in Japan and China as the cause of dermatitis. Cases caused by it have, however, been rare in this country, and the writer records this one as the first coming under his observation. The fact that dermatitis is caused not only by the fresh plant but also by old varnish proves the irritant substance to be remarkably stable.—G. N. T.

LACQUER DERMATITIS OR DERMATOSIS INDUSTRIALIS (PAPULOVESICULAR LACQUER). *J. T. Wayson. Arch. Dermat. and Syph., July, 1923, vol. 8, pp. 77-78.*

At one of the largest pineapple canneries in Hawaii, every can passes through a hot bath made of one part of a commercial lacquer and five parts of gasoline. Those who handle the cans as they come from the bath often have a skin irritation, usually in three stages: First, the skin becomes red, greatly irritated and swollen, somewhat resembling a scarlet fever rash with, at times, severe itching. After about forty-eight hours there is an increased swelling of the affected parts and development of a papulovesicular eruption. At the end of ten days or two weeks more there ensues a period of desquamation lasting for several days. The more elderly laborers seem to be most susceptible. Removal of the patient from exposure on the first appearance of the rash usually results in a mild case.

The wearing of gloves reduces the number of cases very markedly. A bland ointment is recommended as a routine remedy. It is believed that the lacquer is the direct cause of the irritation; the gasoline may add to the effect and, in rare cases, may bring about an acute conjunctivitis without an accompanying dermatitis of the exposed skin.—G. N. T.

RESIN DERMATITIS. *L. G. Beinhauer. Jour. Am. Med. Assn., July 7, 1923, vol. 81, pp. 13-15.*

Beinhauer reports a case of dermatitis occurring on the second and third fingers of the left hand of a violinist as a result of resin dust particles falling from the violin bow over the fingers showing the eruption.—K. R. D.

IN REGARD TO A LESION FOUND IN POTTERY WORKERS. *F. Barettoni. Il Lavoro, Jan., 1923, vol. 14, pp. 12-16.*

Pottery workers show trade stigmata in the form of loss of surface epithelium of the hands on the palm and palmar surface of the fingers, in those processes where the wheel is employed. Friction wears down the hands which are moist from the clay. Infection is rare. The author recommends the use of glove fingers or a covering for the palm of the hand.—J. W. S. B.

INDUSTRIAL EYE INJURIES. *F. Allport. New York Med. Jour., June 20, 1923, vol. 117, pp. 733-736.*

In an address before the Chicago Society

of Industrial Surgeons the author emphasized the need of:

1. Proper examination of the eyes, prior to employment, by an experienced oculist.
2. Suitable illumination in order (1) to reduce accidents, and (2) to avoid mistakes.
3. Shop goggles.
4. Care of eye accidents.
5. Precautions in certain occupations, such as chemical occupations, etc.—M. C. H.

CATARACT IN GLASS BLOWERS. *Berlin Letter. Jour. Am. Med. Assn., April 21, 1923, vol. 80, p. 1163.*

At the request of the medical inspector of factories, Wirth examined 158 glass blowers of a large bottle-making plant. In the 40-60 age group he found 32.4 per cent., and in the 60 plus age group, 73.3 per cent., with signs of cataract. These figures are somewhat higher than those reported by other investigators, which is due to the fact that the examination was made with the pupil dilated. The posterior cortical cataract, which was found by English investigators in 50 per cent. of the glass blowers affected with cataract, Wirth observed in only 25 per cent. It was noted that, in the glass works, protective panes of blue or gray glass covered all the work openings, but on examination of these panes it was found that they allowed the passage of all light rays, the blue panes almost without change, the gray panes merely with decreased intensity.—K. R. D.

"MINERS' NYSTAGMUS." *F. Robson. Inst. Mining Eng., Cardiff.*

On March 22, and April 27, 1923, Dr. Robson read a paper before the South Wales Institute of Mining Engineers in which he put forward the hypothesis that miners' nystagmus was caused by chronic gas poisoning by carbon monoxide or other gases. He said that the proportion of volatile matter in the coal diminishes from east to west in the South Wales coal field and that there is a correlated diminution in the incidence of the disease in the same direction.

In the discussion the statistics on which Dr. Robson's hypothesis was based were subjected to criticism on the ground that they were not expressed in percentages; it was also shown that when so expressed the correlation between the incidence of the disease and the volatility of the coal no longer existed. The inherent improbability of the correlation was pointed out by Dr. Haldane, who showed that the percentage of carbon monoxide present in coal mines is physiologically negligible and that owing to the increased barometric pressure the miner has a better oxygen supply in his lungs than the surface worker.—T. L. L.

INDUSTRIAL SURGERY

THE SO-CALLED RAILWAY SPINE. *F. W. Carruthers. South. Med. Jour., March, 1923, vol. 16, pp. 216-217.*

As orthopedic surgeon for the Rock Island Railroad, the writer has seen a great number of spinal cases. He calls attention to the many varieties of such cases and their attending complications. The subject of X-ray findings is discussed and the difficulty of distinguishing between normal and abnormal conditions noted. A case of fracture of the spine is given, emphasis being placed on the fact that in such cases X-rays should be made in the anterior, posterior, and lateral positions. Fractures of the spine are stated to be rather common and not to be considered serious if there are no neurological findings; if these are present, the injury should be judged according to the symptoms.—G. N. T.

MACHINE INJURIES OF THE HAND. *Mandl. Wien. klin. Wchnschr., 1923, 36, p. 137.*

A summary is given of results in cases of torn ligaments, opening of the small joints, and complicated fractures of the phalanges. Conservative procedure with primary suture after suitable cleansing with Pregl's solution has resulted in good functional recoveries. In general, the healing tendency in the hands of workers is no worse than in the hands of other patients. Radical treatment in many cases has resulted in an average of fifteen days for recovery as compared with forty-five days for healing, following simple bandaging of the injured hand.—B. C.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

MONTHLY VARIATIONS IN MUSCULAR EFFICIENCY IN WOMEN. *L. M. Moore and J. L. Barker. Am. Jour. Physiol., May, 1923, vol. 64, pp. 405-415.*

"Daily observations of muscular efficiency in women over periods including from 2 to 12 monthly cycles each, with a total of 88 cycles, revealed periodically recurring variations coincident with the monthly cycle.

"The typical variations are a menstrual decrease in strength followed by an inter- and premenstrual increase extending throughout the greater part of the cycle, but broken at about the 23rd day by a sharp fall of short duration.

"There is no indication of a marked depression during *normal* menstruation sufficient to interfere appreciably with women's activities."—M. C. S.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

SKIN INJURIES FROM ELECTRICITY. *S. Jellinek. Wien. klin. Wchnschr., 1923, vol. 36, pp. 157-158.*

The burns may be of all degrees, even to local ashing of the bone. Metallization is also frequent, the finely divided metal coloring the tissues. Iron usually produces a brownish-black coloration, and copper, a yellowish-brown. The metallized skin peels off in a short time, but the nails retain the metallization until they have grown out of the nail bed. Discoloration and precipitation are found as a result of electrolysis. The mechanical lesions are numerous, but the electric current mark is a peculiar and characteristic dermal change. It is peculiar in clinical behavior, in pathological anatomy and histology, and in etiology. This mark is not a burn in the ordinary sense, there being no blisters, reddening or pain. It is usually round and pale yellow. It remains for weeks, and then is cast off, together with necrotic tissue, to give way to highly vascularized granulation, which remains soft and never loses the vascularization to form a scar. The hair is not burned or singed.

The electric mark should be distinguished from burns due to flash or arc. The effects of each are quite different, though they may be merged in particular cases.—B. C.

HEAT, COLD AND HUMIDITY

A PSYCHROMETRIC CHAMBER AND ITS USES. *R. R. Sayers and W. J. McConnell. Nation's Health, April, 1923, vol. 5, pp. 237-239.*

This article gives in condensed form the material contained in the paper by McConnell and Houghten on "Some Physiological Reactions to High Temperatures and Humidities," which was reviewed in the Abstract Section of THIS JOURNAL, 1923-1924, *5*, 67.—P. D.

WOMEN AND CHILDREN IN INDUSTRY

THE QUESTION OF PHYSICAL INJURY TO THE WORKING CHILD OF FOURTEEN TO SIXTEEN. *H. G. Rowell. Boston Med. and Surg. Jour., May 31, 1923, vol. 188, pp. 856-858.*

Reference is made to children employed chiefly in the textile mills of New Bedford, Mass. The physical gain of these children during the period of employment was consistently positive. In those tasks permitted by the Massachusetts law, the possible danger to the health of the normal child is not very great. Normal growth does not seem to have been arrested by working.—B. C.

CHILD LABOR IN THE SUGAR BEET FIELDS OF MICHIGAN. *W. W. Armentrout, S. A. Brown, and C. E. Gibbons. Nat. Child Labor Comm., New York, 1923.*

This study made by the National Child Labor Committee during the beet season of 1922 substantiates statements made in earlier investigations in Michigan and Colorado. It describes the working conditions of children; their family status; living conditions; land tenure; the organization of the industry; and school relations and opportunities.—M. C. H.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

CONTROLLING AIR CONDITIONS IN THE PLANT. *Abstr. as follows from Dodge Idea, May, 1923, pp. 12-13, in Am. Management Rev., June, 1923, vol. 12, p. 19.*

This article covers quite completely the practical problem of maintaining the health of workers through adequate ventilation.—M. C. S.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

THE PSYCHOLOGY OF THE MEDICAL EXAMINATION. *B. A. Buell. Indust. Doctor, June, 1923, vol. 1, pp. 117-119.*

Dr. Buell discusses the importance of consideration of mental disability as a factor complicating many cases of industrial injury. The idea of disability is frequently fixed by unscrupulous or injudicious comment of physicians attending such cases. He believes that corporations employing full-time physicians should have at least one qualified to conduct psychiatric examinations. It is very desirable that injured workmen be informed fully regarding their legal rights, as ignorance of such rights is responsible for much of the mental disorder following industrial injuries. As progress is made in the prevention and redemption of physical disability, so will the future bring thought for the prevention of mental disability and for the rehabilitation of the mentally disabled.—W. W.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

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GENERAL

ANNUAL REPORT OF CHIEF INSPECTOR OF FACTORIES FOR 1922. *H. M. Stationery Office, 1923, pp. 153. Cmd. 1920.*

A review is first given of the state of trade during 1922, a year of depression. Yet the registered factories increased from 135,356 to 137,858 while the number of workshops declined from 148,266 to 145,684. The tendency for factories to increase and for workshops to decrease in number has been manifest in the figures for several years; it is welcome as better conditions of labor are to be found in larger concerns. Special attention is given to safety and accident prevention, and the need for working out severity and frequency rates is stressed; without such rates the value of preventive measures cannot be estimated. The safety-first movement is growing slowly but surely. Its success is shown by three examples: in one a frequency rate fell from 32.8 in 1920 to 25.9 in 1922, and a severity rate from 1.44 to 0.88; in a second the frequency rate fell from 50 in 1919 to 28 in 1922, and the severity rate from 3.1 to 0.7; in a third the accident compensation paid per £100 wages which was 5/6½ in 1914 and 5/3 in 1915 fell to 2/6 in 1920 and 2/10 in 1922. Several types of accident are discussed and tables are given analyzing accidents due to cranes and power presses. The personal (in contrast to the mechanical) element in accident causation is brought out by analysis of dock accidents in London where 50 per cent. of the accidents were due to persons slipping or falling, or to pinches, cuts, and scratches, strains, sprains, and ruptures. In many other instances, also, as in being struck by moving objects, this element plays an important part. In truth, hazardous practices are more serious than lack of safeguards.

The removal of dust and fumes by mechan-

ical ventilation continues to be improved in many processes; one of the most difficult cases is that of dust from stripping and grinding roller and clearer cards in the cotton industry, which in time past was the cause of strippers' asthma; in this connection a vacuum system is giving promising results. Steam in dye works presents another problem only to be solved by dry heat, keeping the temperature above fog point. Reference is made to lighting; glare from inadequately shaded and badly placed lamps is a greater cause of trouble than a low standard of illumination. Hours of work are reported to have been reduced to from forty-four to forty-eight hours per week without resort to legislation, and no tendency to extension is manifest. Workers do not desire it and employers object to paying high overtime rates; while output is said to be nearly up to that of the longer hours. The interesting new system of two eight-hour shifts between 6 A.M. and 10 P.M. has not yet been used sufficiently to pronounce upon; but in a few instances it is proving an unqualified success. Statutory welfare, enforced by orders, is progressing; and voluntary welfare schemes, in which the true spirit of welfare is manifest, continue to gain ground notwithstanding hard times. First-aid and ambulance work has gone ahead, and is now an integral part of the organization of most factories; a close relation is reported between the occurrence of septic cases and lack of recourse to early treatment, and one case is quoted in which on account of lessened sick claims the levy was reduced simultaneously with an increased scale of invalidity payments.

Dr. T. M. Legge contributes a chapter dealing with the work of the medical staff. Cases of lead poisoning remained low—less than half the number which occurred annually from 1912 to 1914; this result has followed concentration on lead dust as the paramount risk, and its prevention. An analysis is given of notified cases of epitheliomatous ulceration distributed by age, length of employment, and material at fault—pitch, tar, or paraffin. The face and neck were involved in 47 per cent. of the cases, the scrotum and groin in 31 per cent., and the hand and forearm in 18 per cent. The table giving the results of medical examinations by certifying surgeons shows how the half-time employment of children has disappeared; only 42 were passed for such work out of a total of 258,462. Again the number of girls certified between 14 and 16 years of age much exceeds that of boys—152,323 compared with 99,369. Rejections for medical reasons amounted to 2 per cent.

When reporting upon electrical accidents, Mr. G. S. Ram reiterates the importance of application of artificial respiration over long periods. Cases are quoted of recovery after 4, 10, 15, 20, 30, and 45 minutes, while in other cases either no effort was made at all or it was made for only a few minutes. In one case artificial respiration "was applied for one minute until an attendant from the ambulance room arrived, pronounced the patient dead and proceeded to tie up his jaw." Mr. Ram records an observation of much interest when he states that "where a man has received a very severe and prolonged shock and has then had a bad fall, if he escapes fatal injuries from the latter as by fracture of the skull, he recovers from the shock." Hence he suggests that mechanical shock might prove a successful form of treatment even where cardiac fibrillation has occurred.

Reference to special research investigations included in this report is made elsewhere.—E. L. C.

LABOUR AND INDUSTRY IN CHINA. *J. B. Tayler and W. T. Zung. Internat. Labour Rev., July, 1923, vol. 8, pp. 1-20.*

This review of the present state of invasion of China by modern industrial methods is full of interest to the student of the industrial revolution in Europe. Today in different parts of that vast country are to be found in existence at one and the same time home industries and trade guilds resembling those of medieval times; overcrowded industrial cities with exploitation of child labor, unrestricted hours of work, and disregard of all care of human life—conditions reminiscent of Lancashire in the early nineteenth century; and here and there up-to-date factories with first-aid equipment, dining room, cloak room, nine-hour day, no Sunday work, and no child labor. China is suddenly faced with modern industrialism, and is attempting in a few years to take at a bound what has taken two hundred years of rapid progress among white races. The signs as yet are few that the worst

of our mistakes are being avoided. Our thoughts revert to the words of Owen and the reports of Chadwick when we read of 120 workmen living, working, eating, sleeping in twenty small rooms. The looms were placed on each side of the doorways, with beds beyond in the background. The men suffer much debility in the damp heat of summer and dysentery is common. The authors tell also of "apprentices" who come hundreds of miles from a neighboring province, and who are entirely in the hands of the employer. These lads serve long terms of apprenticeship with no pay except a few dollars a year and such keep as is suggested above, and no prospect of occupation at the end. Even in the newer and larger factories hygiene is neglected; ventilation and dust prevention are unheard of; yellow phosphorus is used in the manufacture of matches and cases of phossy jaw are frequent; machinery is unguarded and terrible accidents to young children are frequent; boys are employed in glass works from 6 A.M. to 11 P.M.; a working day in silk filatures in Shanghai of fourteen and a half hours is common and knitting machinery is often run sixteen and even seventeen hours a day. Of a very truth unless China wakes to the good things of modern industry instead of adopting all the worst, she will rue the day, and that quickly, when she allowed the foreigner to invade her shores and subvert her centuries-old civilization.—E. L. C.

ADMINISTRATION OF LABOR LAWS AND FACTORY INSPECTION IN CERTAIN EUROPEAN COUNTRIES. *G. M. Price. U. S. Month. Labor Rev., June, 1923, vol. 16, pp. 1-19.*

The writer discusses his subject under the following headings: (1) breakdown of factory inspection during the war; (2) slow recovery during reconstruction period; (3) number of industrial establishments; (4) changes in organization; (5) salaries of inspectors; (6) selection of inspectors and assistant inspectors; (7) works councils, shop committees, etc., and medical factory inspection.

The countries visited were England, France, Switzerland, Germany, Austria, and Belgium.—R. B. C.

INDUSTRIAL DISEASES. *Belgium Letter. Jour. Am. Med. Assn., June 9, 1923, vol. 80, pp. 1706-1707.*

Before the Society of Legal Medicine of Belgium, Dr. de Laet has developed a plan that he recommends for the study of industrial diseases and for the organization of the campaign to combat them: (1) the institution of observations on the ground, which may be entrusted to the factory physician; (2) the creation of institutions for thorough examinations, treatment, and the centralization of studies, which will give rise to the clinic of industrial diseases; and (3) the establishment by legal enactment of the factory physician and the clinic for industrial diseases; the provision of modes of indemnification; and a division of the burden which would result in legislation protecting workmen against industrial diseases.

An advance draft of a law, published in 1920, provides for the indemnification of the workman who is the victim of a recognized industrial disease, according to the degree to which he is temporarily or permanently incapacitated for work. It regulates the details of payment, and states the conditions that give rise to a claim. It provides for the creation, under the name of *Caisse d'assurance contre les risques de maladie professionnelle*, of a fund for the purpose of providing for the payment of allocations due in connection with cases of recognized industrial disease. The fund, according to the draft, will derive its resources in part from the state and in part from the heads of the establishments in whose industries recognized industrial diseases are wont to arise.

Unfortunately, in these times of financial stress this proposed law runs the risk of being deferred indefinitely. For this reason, Dr. de Laet, in face of the danger which is becoming more and more threatening, has a proposal that he thinks will effect a prompt solution of the problem. Since the workmen cannot hope, within the immediate future, to obtain any considerable aid from the public authorities, they might possibly do well to establish a mutual aid system. Their large unions have preferred to establish *cliniques de travail* (industrial clinics) themselves rather than wait for the authorities to create them. In the same manner, why cannot the *caisse d'assurance* (the insurance fund), provided for in the proposed law, derive its re-

sources from the labor unions and the employers, together with a very moderate subvention from the state? Even though this solution were only temporary, it would have at least the great advantage of furnishing adequate care and compensation to sufferers from industrial diseases.—K. R. D.

INDUSTRIAL HYGIENE AND PREVENTION OF ACCIDENTS IN CHEMICAL INDUSTRY. *G. Wolff. Abstr. as follows from Schweiz. Chem. Ztg., 1922, vol. 281, pp. 295-298, 311-314, in Chem. Abstr., June 10, 1923, vol. 17, p. 2021.*

The dangers to workers include overexertion, overwork, and exposure to heat, cold, fire, dust, flying splinters of metal, and excessive sound waves. Special instances are cited to show the dangerous occupations due to mechanical, chemical, or bacterial causes. Enforced cleanliness and instruction regarding dangers and means of avoidance are urged. Dangerous metallic and organic compounds are listed, as well as the industries in which infection is prevalent, particularly tuberculosis. Hygienic measures are emphasized.—P. D.

THE RESPONSIBILITY OF THE EMPLOYER. *C. E. Jackson. Hosp. Management, July, 1923, vol. 16, pp. 64-66.*

The responsibilities of the employer for the health of the worker are dealt with in this article, and bear a different outlook as seen from economic, social, or medical viewpoint. Seven phases of this responsibility are presented.

1. The work place should be safe, beautiful, and suitable. The layout should be arranged so that the work can be done with the least possible fatigue and the greatest possible safety and comfort.

2. Well-guarded machinery and tools which permit of rapid and accurate work of good quality should be installed; all methods and processes used should have health and body hazards reduced to a minimum.

3. The employer must establish his contact with the worker through foremen and heads of departments. Since the worker gets his ideas about the work, the boss, and the industry in general from the foreman or supervisor, great care should be taken when employing persons for positions of authority. They should be men who understand human nature.

4. Employees should be placed on work which suits them both mentally and physically. In order to do this, competent employment and medical departments are necessary.

5. The employer has the responsibility of protecting his workers from communicable diseases.

6. The responsibility for the prevention of disease should be recognized. The employer should remove the chance of illness from his workers by education and by frequent examination. Preventive medicine in industry is our biggest and hardest task. Health propaganda is a big asset toward this end.

7. Shortening of hours with increasing chance for rest and recovery from fatigue increases the total output in industry.

The General Electric Company (Edison Lamp Works) is cited as one which sees the situation in the light of this author.—G. N. T.

RECLASSIFICATION OF THE UNITED STATES 1920 OCCUPATION CENSUS, BY INDUSTRY. *C. Hookstadt. U. S. Month. Labor Rev., July, 1923, vol. 17, pp. 1-14.*

"For years there has been a great demand for a classification of all the employees in the United States by industry. The Federal Census of Manufactures is good as far as it goes, but unfortunately it covers only one-third of the employees of the country. The United States occupation census is primarily a classification by occupation although these occupations are arranged in nine large industrial groups. The occupation census, moreover, includes all persons over 10 years of age 'gainfully employed,' and in many cases does not distinguish between employers or independent workers, and bona fide employees. For example, such occupations as blacksmith, dressmaker, shoemaker, carpenter, architect, etc., include all three types of 'gainfully employed.' Furthermore, many of the occupations contained in the census classifications are not limited to the industrial group in which they are included. For illustration, blacksmiths, carpenters, machinists, and stationary engineers and firemen are placed in the manufacturing and mechanical industries group, although such occupations are common to practically all the census industrial groups, including agriculture, mining, transportation and trade. An attempt has here

been made therefore to unscramble the federal occupation census, first by separating the employees from the employers and independent workers and second by redistributing the census industrial and occupational groups into the standard industry classifications formulated and adopted by the committee on statistics and compensation insurance cost of the International Association of Industrial Accident Boards and Commissions. That industry classification was prepared for the purpose of standardizing industrial accident statistics and consequently the industries and occupations were classified primarily from the standpoint of hazard. One of the great weaknesses in the accident statistics compiled by the various states is the lack of accident frequency and severity rates. This lack has been due almost wholly to the inability to obtain exposure, *i.e.*, the number of employees in the several industries. It was for the purpose of assisting in obtaining this exposure that the following redistribution of the census occupation classifications was attempted."

Five tables are appended, showing the number of employees, officials and managers, and employers, classified according to the census industrial groups, and reclassified according to the arrangement adopted by the International Association of Industrial Accident Boards and Commissions.—R. B. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

COMPARISON OF GAS MASKS, HOSE MASKS, AND OXYGEN-BREATHING APPARATUS. *S. H. Katz and J. J. Bourquin. U. S. Bur. Mines, Rep. Investigations, Serial No. 2489, June, 1923.*

A brief pamphlet outlining the uses and practical objections to different types of gas masks, hose masks, and oxygen-breathing apparatus. Although the paper is brief, it is well arranged and gives precisely the type of information a prospective user or buyer of these apparatus would like to know.

Because of its tabulated presentation it is unsuited for abstracting.—P. D.

THE UNIVERSAL AND THE FIREMAN'S GAS MASKS. *S. H. Katz, J. J. Bloomfield, and A. C. Fieldner. U. S. Bur. Mines, Tech. Paper 300, 1923, pp. 22.*

Both masks are illustrated and described in detail. The same absorbents are used in the canisters of both masks, the difference between the two being one primarily of size and therefore of protection of life. The fireman's canister weighs 4 pounds, and the universal weighs 7 pounds. In both cases the masks and harness add about 1½ pounds.

The new canisters were designed to meet industrial situations in which various types of gases are met and in which it is not always feasible to have special canisters. The advantage claimed for the new canisters is their power to absorb practically any noxious fume encountered in any but the most dense concentrations.

In the order in which they are encountered by the entering air, the absorbents in the canister are: (1) dry activated charcoal; (2) fused caustic soda on granular pumice; (3) fused calcium chloride; (4) hopcalite, a mixture of oxides of manganese, copper, and sometimes silver and cobalt made into granules; and (5) silica gel. Light wire screens alone or in combination with cotton wool filters are interposed between the layers of absorbents where necessary to separate the several layers.

In the appendix is given an eight-page outline of the standard test requirements of the Bureau of Mines for gas masks.—P. D.

THE USE OF BREATHING APPLIANCES IN CHEMICAL WORKS. *L. Levy. Abstr. as follows from Chem. Age (London), 1923, vol. 8, pp. 362-363, in Chem. Abstr., June 20, 1923, vol. 17, p. 2158.*

The best respirators consist of three portions: a face-piece, a connecting tube, and a purifying chamber carried by a suitable harness. For chemical works the breathing appliance should have a respirator affording complete protection against any concentrations of toxic substances, should be reasonably comfortable to wear, with ample warning of approaching breakdown, should not deteriorate when not in use, and be so de-

signed that it can be put on quickly with perfect fit assured. Refills for the purifying chamber should be inexpensive. Two types of respirators are available: one functioning by a perfect purification of the contaminated atmosphere and only available where the proportion of oxygen in the purified atmosphere is adequate; and one possessing a self-contained oxygen breathing set. Each part, types of filling, and the breathing sets are described.—P. D.

NEW MINE RESCUE APPARATUS, "AUDOS," OF THE HANSEATIC APPARATUS COMPANY IN KIEL. *D. Mühlefeld. Abstr. as follows from Kali, 1922, vol. 16, pp. 87-89, in Chem. Abstr., June 10, 1923, vol. 17, p. 2021.*

This belongs to the group of regenerating devices whereby the expired air is deprived of carbon dioxide, then is enriched with oxygen and breathed again. The apparatus is described in detail with the aid of three illustrations.—P. D.

THE PYRO TANNIC ACID METHOD FOR THE QUANTITATIVE DETERMINATION OF CARBON MONOXIDE IN BLOOD AND AIR. *R. R. Sayers, W. P. Yant, and G. W. Jones. U. S. Bur. Mines, Rep. Investigations, Serial No. 2486, June, 1923, pp. 6.*

It is of vital importance in all domestic and industrial accidents occurring in places where carbon monoxide might be suspected or where the symptoms are typical of carbon monoxide poisoning that a qualitative and preferably a quantitative determination be made (the extent of poisoning being of importance in deciding whether carbon monoxide was the direct or contributory cause) to show the presence or absence of carbon monoxide. This is indeed essential from a medical standpoint, as it aids in prescribing treatment, and from a legal standpoint, as it insures justice in claims that are often unjustly decided for want of positive evidence.

An apparatus has been designed by which it is possible to detect the presence of carbon monoxide in the blood in three minutes and to determine the exact amount present within fifteen minutes, thus filling the needs of hospitals, industrial surgeons, safety engineers, and others.

The method is based on the fact that a light brownish gray suspension is formed after a few minutes when normal blood diluted with water is treated with a solution of tannic and pyrogallic acids; light carmine suspension is formed in blood having carbon monoxide in combination with all of the hemoglobin (Hb). Furthermore, in any mixture of normal blood containing carbon monoxide the suspension formed will be a corresponding mixture of the two extremes of color. The amount of carbon monoxide-hemoglobin (CO Hb) can be evaluated by matching with a set of standards representing the different colors of varying but known amounts of carbon monoxide in combination with hemoglobin. The standards have been prepared from pigments. Apparatus has been devised that can be arranged in a compact pocket case 3 by 7 by 1¼ inches. Chemicals used are prepared in solid form to avoid deterioration. Comparison of the unknown specimen is made in daylight after standing fifteen minutes, and the quantity of carbon monoxide-hemoglobin is determined directly from the standards.

It is possible to make a quantitative determination of carbon monoxide in air by treating a dilute solution of normal blood with a measured sample of the air and determining carbon monoxide-hemoglobin as described above. Carbon monoxide can then be calculated from the following formula:

$$PCO = \frac{CO\ Hb}{100—CO\ Hb} \times \frac{2093}{300}$$

Where PCO = parts of CO per 10,000 of air and CO Hb = percentage saturation as found by analysis.

For example: A blood solution equilibrated with a gas sample was found to contain 50 per cent. of CO Hb by comparison with the standards; substitution of this value of CO Hb in the equation gives the following:

$$PCO = \frac{50}{100—50} \times \frac{2093}{300} = 7 \text{ parts per}$$

10,000 or 0.070 per cent.

Great accuracy is possible by this method. —G. N. T.

DANGERS OF AND TREATMENT FOR CARBON MONOXIDE POISONING. *R. R. Sayers and W. P. Yant. U. S. Bur. Mines, Rep. Investigations, Serial No. 2476, May, 1923, pp. 11.*

The paper gives in considerable detail the common sources of carbon monoxide met in various industries and in everyday life, the methods of detecting carbon monoxide, its action on hemoglobin, its physiological and pathological action, symptoms of poisoning, diagnosis, and treatment.—P. D.

ACUTE AND CHRONIC CARBON MONOXIDE POISONING IN MINERS. *Il Lavoro, March, 1923, vol. 14, pp. 88-89.*

Following the explosion of a blasting charge the gallery is invaded by a cloud of dust and fumes for 200 meters. In fifteen to twenty minutes the workers return and at this time occur the acute cases, with malaise and sudden loss of consciousness. The physical findings are cyanosis, sweating of the forehead, slow pulse, and superficial respiration. Consciousness returns after several hours. The chronic form of poisoning shows itself in weariness, fatigability, drowsiness or restlessness, depression, anorexia, with dyspepsia leading to a general wasting. The blood shows various forms of oligemia and almost always arterial hypotension.

Studies of the gases present showed little of the stable oxides of nitrogen; carbon dioxide was present in the same amount as before the explosion, whereas carbon monoxide was much increased. Carbon monoxide was found in the blood in one acute case.—J. W. S. B.

THE RESUSCITATION OF VICTIMS OF ASPHYXIA. *R. Legendre and M. Nicloux. Abstr. from Acad. d. Sciences, Jan. 29, 1923, in Ann. d'Hyg., April, 1923, N. S. 4, p. 237.*

Asphyxia and the treatment of asphyxiated victims are reviewed. The abstractor implies that the authors give preference to the French method of resuscitation rather than to the English or prone pressure method. In either case the administration of oxygen in carbon monoxide asphyxia is advocated.—P. D.

HISTOPATHOLOGY OF BLOOD POISONING FROM INDUSTRIAL BENZOL. *C. Zenoni. Abstr. as follows from Atti d. Soc. Lomb. Sc. Med. e Biol., 1922, vol. 11, p. 339, in Med. Science, July, 1923, vol. 8, p. 332.*

Investigations were made on the material obtained from three fatal cases observed at the same time in the hospital of Milan. The following lesions were noticed at the post-mortem examination: multiple hemorrhages in the skin and almost all internal organs, bone marrow included; general oligemia, parenchymatous fatty degeneration of the myocardium, liver, and kidneys; fatty bone marrow; spleen and lymph glands fibrous and not enlarged. Histologically, the three cases were characterized by: (1) noticeable hypoplasia of the bone marrow with toxic leukolysis, disappearance of megakaryocytes, and scanty production of erythroblasts; (2) parenchymatous atrophy of the spleen with a corresponding increase of fibrous and reticular tissues, presence of many plasma cells, and considerable amounts of blood-pigment; (3) fatty degeneration of the wall of many small blood vessels. In the opinion of the author these observations show that the histopathological picture of acute benzol poisoning in man is noticeably different from that of pernicious anemia.

NEW INVESTIGATIONS OF THE BLOOD AND THE BLOOD-PRODUCING ORGANS IN BENZENE POISONING. *G. Fontana. Abstr. as follows from Giorn. Clin. Med., 1922, vol. 2, pp. 93-98; Ber. Ges. Physiol., 1922, vol. 12, pp. 78-79; Chem. Zentr., 1922, vol. 3, p. 78, in Chem. Abstr., Aug. 20, 1923, vol. 17, p. 2748.*

The extreme leukopenia caused in rabbits by daily injections of 1 c.c. of benzene per kilogram affects the neutrophiles much more strongly than the lymphocytes. The erythrocytes do not decrease greatly, but the total number of blood corpuscles diminishes. The spleen becomes atrophic and the marrow of the femur gelatinous. Mononuclear cells and megakaryocytes predominate in the leukocytes.—P. D.

HYDROGEN SULPHIDE AS AN INDUSTRIAL POISON. *R. R. Sayers. U. S. Bur. Mines, Rep. Investigations, Serial No. 2491, June, 1923, pp. 6.*

The author's summary is essentially as follows:

Hydrogen sulphide is an industrial poison, the toxicity of which has not been fully realized. Cases of poisoning have occurred in relatively large numbers.

The poisoning by hydrogen sulphide is of two types—acute and subacute—causing

asphyxiation and irritation (conjunctivitis, bronchitis, pharyngitis, and depression of the central nervous system), respectively. Death from asphyxia is caused by paralysis of the respiratory center, while death from subacute poisoning is associated with edema of the lungs. The exact low limit of concentration at which hydrogen sulphide ceases to act as a poison has not been determined as yet, but is evidently below 0.005 per cent.

Hydrogen sulphide in low concentrations produces symptoms of headache, sleeplessness, dullness, dizziness, and weariness. Pain in the eyes followed by conjunctivitis is fairly constant, while bronchitis and pains in the chest are frequent. Further poisoning produces depression, stupor, unconsciousness, and death. Spasms—clonic and tonic in character—are present, and death occurs following paralysis of the respiratory center.

The pathology is typical of the two types of poisoning. In subacute cases there is destruction of the lining of the lungs, together with inflammation and edema. In acute cases where death is due to paralysis of respiration, the exact method of the poisonous action has not been determined.

Treatment of acute cases consists in immediate removal from the toxic atmosphere, and the immediate administration of artificial respiration. The breathing of oxygen is advisable when possible. The treatment of subacute cases should be symptomatic. All cases should be under the care of a physician. Where hydrogen sulphide gas may exist, good ventilation results in a decrease in the number of accidents. The canister type of mask, hose mask, and oxygen-breathing apparatus are of value in protecting the men in case of emergency.—R. M. T.

Dangers to Health in Photo-Engraving. *Internat. Labour Rev., July, 1923, vol. 8, pp. 116-125.*

This article is a report upon an inquiry undertaken by the Industrial Hygiene Service of the International Labour Office. It is based upon information gathered from Germany, Great Britain, Italy, the Netherlands, and Switzerland. A description is given of the different methods in use in the various countries in photo-engraving, particular attention being directed to means adopted to minimize danger from fumes of nitric acid and from possible poisoning by arseniuretted hydrogen. Experiments revealed that nitrous fumes are liberated far more readily if the acid is over 15 per cent. in strength than from weaker solutions; in Italy strong acids are used and a high mortality is reported among photo-engravers. Generally speaking, however, this inquiry, which is of interest from its international character, did not disclose the existence of serious morbidity or mortality. The danger is recognized and steps to combat it are for the most part adopted.—E. L. C.

Idiosyncrasy to Mercury. *F. Meiné. Abstr. as follows from Brit. Med. Jour., June 30, 1923, vol. 1, p. 1092, in Jour. Am. Med. Assn., Aug. 18, 1923, vol. 81, p. 610.*

Meiné cites the case of a young woman whose eyelids were edematous, with small pearlish blebs on the skin surface; there was a good deal of injection of the conjunctivae, with similar blebs on them. She complained of excessive watering of the eyes, blurred vision and photophobia. On the posterior surface of the auricle and skin adjoining were erythematous pearllike blebs. All down one side of the neck over the distribution of the fibers of the trapezius was a distinctly shotty erythema. The case appeared a puzzle until Meiné went into the question of occupation. The patient had lately been engaged as a dental nurse; she had been clearing up amalgam fillings, and had touched some globules of mercury. Evidently she had rubbed her eye with the finely divided metallic mercury and set up slight mercurial poisoning. She had some slight watering of the mouth, and the parotid was very tender. Evidently the case was one of special idiosyncrasy to mercury.—K. R. D.

Respective Rôles of Lead and Essence of Turpentine in Painters' Disease. *F. Heim, E. Agasse-Lafont, and A. Feil. Abstr. as follows from Compt. Rend., 1923, vol. 176, pp. 270-271, in Chem. Abstr., June 10, 1923, vol. 17, p. 2057.*

The pathologic conditions exhibited by painters have been attributed to the actions of both lead and turpentine. Among twenty-one workmen who had handled only turpentine and zinc white no pathologic renal conditions were detected, but a notable hyperten-

sion was observed in two cases. In fourteen painters handling lead, two cases of albuminuria and two of hypertension were observed. Among 200 painters handling lead, 30 per cent. showed hypertension. The conclusion is that lead and not turpentine is the cause of both the renal lesions and the hypertension.—P. D.

WRIST DROP AS A SYMPTOM OF LEAD ABSORPTION AND LEAD POISONING. *L. Teleky. Abstr. from Klin. Wchnschr., 1923, No. 19, in München. med. Wchnschr., May, 1923, vol. 70, No. 21, p. 685.*

The author finds weakness of the extensors of the right hand in lead poisoning and also in certain lead workers who show no other symptoms of lead. He believes that this is an important early sign from the point of view of prevention of poisoning and of judging clinical symptoms—for instance, in determining whether or not an existing nephritis is due to an earlier lead intoxication.—A. S. M.

PAINTERS' COLIC: HOW CAUSED AND HOW BEST PREVENTED. *Reprinted from Home Office Form 394. H. M. Stationery Office, June, 1923, pp. 2.*

Lead poisoning from breathing the dust given off in dry rubbing down is the main occupational risk among painters.

In the five years, 1910 to 1914, 1,079 cases of lead poisoning among painters (by no means all that must have occurred) came to the knowledge of the Factory Department, including 169 deaths, and in addition to these there must have been a large number of painters suffering from the effects of lead in a less degree.

The symptoms in the painter are usually colic and constipation, and, less frequently, "drop wrist" (loss of power to extend the fingers and wrists), although painters seem to suffer from this form of paralysis rather more than lead workers do in general, presumably because of the special strain the work places on the forearms. After years of work the constitution becomes undermined from the slow action of lead on the blood vessels and kidneys (chronic Bright's disease).

Remember that these symptoms in the painter follow only on breathing in dust. What happens is that the dust sticks on the moist surfaces inside the mouth and is either swallowed or passes into the air tubes. You breathe sixteen times a minute, and in and out the dust goes, but always a little less out than in. So long as paint ready mixed with oil is used, and in a cleanly way, painting operations involving no dry sandpapering ought to be harmless and ought not to give rise to any poisoning. *You may be quite certain about this.*

Lead paint never enters the system directly through the pores of the skin, but it can, of course, collect on the hands and under the finger nails and be eaten by very careless painters. Incidentally, it may be said, evidence is lacking that breathing in dust from dry rubbing down zinc paints is hurtful.

A painter can help himself to keep fit. He should pay scrupulous attention to keeping his hands and teeth clean. Too much stress cannot be laid on the part played by bad teeth in lowering the health.

Never commence work on an empty stomach; foods containing fat, such as bacon and milk, are suitable.

Where there is any tendency to constipation, aperient medicine, such as Epsom salts (one to two teaspoonfuls in water) can be taken with advantage once or twice a week.

Overall suits should never be shaken to rid them of dust, as this causes more dust in the air you breathe; they require washing at least once a week.

Medical advice should at once be sought if signs of lead poisoning present themselves. Wrist drop will always incapacitate a man for months, and may prove *permanent* unless electrical treatment is obtained *in time*.

Though lead poisoning is the most serious risk to which painters are exposed, turpentine vapor also—as every painter knows—causes headache and giddiness and (when working in confined spaces) sometimes sickness and pains which may occasionally be confused with lead colic. These symptoms nearly always quickly disappear on going into the fresh air, and do not occur when the ventilation is good. Fresh air and good ventilation, therefore, constitute the antidote to fumes of turpentine. Turpentine has action on the kidneys, but chronic Bright's disease from it is not proven.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

TUBERCULOUS LESIONS AND TRAUMA. *L. C. Massini. Il Lavoro, May, 1923, vol. 14, pp. 131-141.*

The author draws the following conclusions:

1. Tuberculosis inoculated in a traumatic lesion is incontestably the direct consequence of the injury.

2. Slight minor injuries, without definite damage and without immediate loss of function, cannot determine the localization of an osteo-articular tuberculosis.

3. A tuberculous osteoarthritis appearing in rapid form less than four weeks after an accident, or in indolent form within eight weeks, can be considered as existing at the time of the accident and revealed by it.

4. The only cases in which localization can be considered as caused directly by the trauma are those in which the osteoarthritis follows serious injuries (fractures, dislocations, etc.), rapidly developing cases in which the first sign of tuberculosis appears after one month, and more indolent cases in which the first sign appears after two months.

5. Existing tuberculous osteoarthritis can be aggravated by injury; but a single traumatism of moderate intensity probably produces less injury than the daily use of a joint which has become affected during the course of normal living and ordinary work.

A bibliography of twenty-two references is appended.—J. W. S. B.

THE BRITISH GOVERNMENT WOOL DISINFECTING STATION. *G. E. Duckering.*

The disinfection process in use at the Government Wool Disinfecting Station at Liverpool is arranged in seven stages; the machinery for opening the bales of raw material, feeding the material into the machines, disinfection, drying, cooling, and re-baling, is designed to permit of the carrying out of all seven stages in sequence as one operation, without direct handling of the material by the workmen. They are as follows:

Stage 1.—Hydraulically pressed bales as imported are placed on the moving platform of a feeding and opening machine and the steel bands and canvas covers removed. The material itself is not touched but travels on the platform into the machine where it is opened and delivered into the first process machine.

In the first process machine it is submitted for ten minutes to the action of a dilute alkaline solution at 102°F. in order to remove the albuminous matters by which the anthrax spores are protected. It is then squeezed through rollers and delivered into the second process machine. The material is here acted on for twenty minutes by a dilute alkaline soap solution at 102°F. in two successive baths, the purpose being to promote a condition of the spores in which they can be killed with comparative ease. This stage is essential to the process and it possesses the advantage that it also cleanses the material completely. It then passes through rollers into No. 4 process machine. In this stage the actual disinfection is carried out, the material passing through two successive baths (with rollers between) of a 2.3 per cent. solution of formaldehyde at a temperature of 106°F. It then passes through rollers and is blown by air into a drying machine (Stage 5), from which it is discharged into a cooling machine (Stage 6), and from there blown by air into the charging box of a baling machine and baled into hard pressed bales of about 320 pounds (Stage 7). The material remains ten minutes in each process bath, and twenty minutes in the drier and cooler, and the process of disinfection from opening the bale to rebaling occupies something like one and one-half hours.

The two machines containing the formaldehyde solution are completely enclosed, but have to be entered at times, for instance, for re-wrapping of the rollers. The workers then wear army box respirators filled with charcoal. These have proved exceedingly efficient. The drying machine is also provided with an extracting fan to prevent escape of air carrying formaldehyde gas into the room. The air, by means of which wool is blown from the cooling machine into the baling press, is also charged with formaldehyde gas and dust. The air, dust, and formaldehyde are separated from the wool in an apparatus

which entirely prevents the workers from being affected.

In order to check the efficiency of disinfection, samples of raw materials and of the materials after disinfection are taken morning and afternoon. Sampling is so arranged that samples of raw material of particular lots, and corresponding samples of disinfected material of the same lots, are taken. Direct comparison between the disinfected material and the raw material is thus obtained.

Material subjected to the process is so cleansed, as well as disinfected, that the usual washing is no longer needed. The process has proved entirely successful for all kinds of material: wool, goat hair, alpaca, horsehair, mohair, and cowhair. The cost of disinfection is approximately only that normally incurred for washing.

Test has been made of a suggested method of disinfection by means of ultraviolet rays, with the result that the method has been found to be of no value for disinfecting wool.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

So-Called Glass-Workers' Cataract Occurring in Other Occupations, with a Report of Two Cases. *A. W. Sichel. Brit. Jour. Ophth., April, 1923, vol. 7, pp. 161-167.*

The author reviews the history of the condition known as glass-workers' cataract from the time when it first began to receive attention eighteen or nineteen years ago. Early investigations showed that people exposed to incandescent molten glass or to continual furnace glare in the flattening of glass suffer more than ten times as frequently as other people from cataract, the characteristic feature of the cataract being opacity of the posterior cortical layers of the lens of varying size within the pupillary area. Subsequent work tended to prove that heat radiation was the active agent. Within the last few years, it has become clear that the occurrence of cataract among industrial workers who are exposed in the course of their employment to continuous heat and glare is not confined to glass workers. Iron "puddlers," chain makers, gold smelters, and tin-plate millmen have all furnished cases. The author cites two cases coming within his own experience.

One was that of a machine-man whose duty it was to attend a furnace in a tire shop where steel tires were removed from or fitted to the wheels of rolling stock. The glare from this furnace was not pronounced, but the heat thrown out was very great. The other was that of a laundress whose duties for the past fifteen years had involved ironing clothes by hand from 7 A.M. until 5 P.M. on three days of the week. The all-important factor appears to be exposure to radiant heat over a sufficiently long period of time. "Ray cataract," a term already suggested, is approved by the author for this special class of lens opacity, for it classifies the condition clearly according to its mode of production. Further investigation is called for in industries in which workers are subjected to prolonged and continuous exposure to radiant heat and light.—G. N. T.

A Statistical Enquiry into 1000 Cases of Eye Injuries. *A. Garrow. Brit. Jour. Opth., Feb., 1923, vol. 7, pp. 65-80.*

This is a statistical account of cases arranged so as to indicate the relative frequency of eye injuries in the various classes of the community, the nature of the injury to which each class is most liable, and other points of interest. The injured persons were all admitted as indoor patients at the Ophthalmic Department of the Glasgow Royal Infirmary during the period from June, 1908, to the end of 1913. It was found that 70.7 per cent. of the eye injuries were occupational in origin. Of these, 516 cases occurred among three classes of workers—engineering workers liable to injury with cold metal (260 cases), coal miners (173 cases), and metal workers liable to injury with hot metal (83 cases).

Small chips of metal were the most frequent cause of injury among those in the engineering, shipbuilding, and steel and iron trades, infected corneal abrasions and penetrating wounds of the eyeball being the results. Among miners, small chips of coal caused infected corneal ulcers, often of a very virulent type. Burns from molten lead were another form of injury frequently en-

countered. Among the non-occupational groups, practically half the injuries occurred among children under 15 years of age although this group formed only 17.7 per cent. of the population of the area. The enucleation percentage rate was 21.8 in the case of non-occupational injuries and only 12.02 in the case of occupational, the higher rate in the first class being due to the preponderance of severe contusion injuries. The enucleation rate in occupational injuries was highest among glass workers. Cases of persons having infected corneal abrasions, burns, and corneal wounds had a low enucleation rate while cases of persons with corneo-sclerotic wounds, lacerated sclerotic wounds, or admitted already suffering from cyclitis had a high rate. The incidence of penetrating wounds in the case of children was almost twice that of adults.—G. N. T.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

STATISTICS OF INDUSTRIAL ACCIDENTS IN THE UNITED STATES. *L. W. Chaney. U. S. Dept. Labor, Bull. No. 339, June, 1923, pp. 60.*

There are five things that must be known regarding groups of accidents if their study is to be of the greatest service in accident prevention. These are (1) the number of accidents occurring; (2) the industries in which they occur; (3) the causes of the accidents; (4) the amount of exposure to hazard; (5) the severity of the accidents. An effort is made in this report to group and interpret the accident statistics of the various states, thus giving a national view of the whole industrial field. Faulty records and lack of uniformity have made this work difficult; however, much has been accomplished. Information has been obtained for forty-two states concerning fatal and non-fatal accidents; for twenty-two states a classification of accidents by industries has been made; for eighteen states a classification by cause of injury; for twelve states a classification by nature of injury; for eleven states a classification by location of injury; for two states the amount of exposure has been compiled; and for three states the severity of accidents. Additional statistics are presented from government agencies; those on steam railways and grade crossing accidents being furnished by the Interstate Commerce Commission; those on mine quarries and metallurgical works by the Bureau of Mines, and those on the iron and steel industry and miscellaneous industries by the Bureau of Labor Statistics.

The report distinctly disclaims completeness. It simply assembles the existing records, pointing out when necessary where and why they are deficient. It contains, however, a larger body of information regarding the severity rates of different industries, and departments of industry than it has been possible hitherto to assemble. An opportunity is afforded for comparison of state accident data and for reference to the reasonably complete and accurate figures on the subject secured by federal agencies.—G. N. T.

DEFECTIVE VISION AND INDUSTRIAL ACCIDENTS. *R. E. Simpson. Safety Engin., June, 1923, vol. 45, pp. 220-223.*

By advocating better lighting in our industries the Travelers Insurance Company has brought about improvements which have cut down mishaps 50 per cent. This betterment has been reached by concentrating mostly upon means and methods for raising the intensity level, correcting faults of distribution, and eliminating glare. Accidents of the kind under consideration may be divided into two general classes: (1) those due to inadequate or improper illumination at the time and place of the accident; and (2) those resulting from defective or subnormal vision.

In many cases the causes of defective vision among adults may be traced back to unfavorable conditions during childhood. The investigators found that approximately 15 per cent. of the children entering school have defective vision, and that about 30 per cent. have defective vision at the end of the high school period.—R. M. T.

MINE RESCUE STANDARDS: A TENTATIVE STUDY. *U. S. Bur. Mines, Tech. Paper 334, 1923, pp. 44.*

An international conference of mining departments was held at St. Louis, September 1 to 3, 1921, under the auspices of the U. S. Bureau of Mines for the purpose of discussing standardized procedure in mine res-

cue work, and standardization of mine rescue apparatus. As a result of the conference, various committees were appointed and instructed to report on certain aspects of the whole problem. These committees were to consider:

1. International mine rescue standards.
2. Rescue apparatus requirements and tests for permissibility.
3. Physiological effects of the use of mine rescue apparatus, and methods for detecting dangerous gases.
4. Regulations for the use of mine rescue apparatus in coal mines.
5. Regulations for the use of mine rescue apparatus in metal mines.

The reports of these committees are incorporated in this paper with a great wealth of detail and in a manner showing the thoroughness with which the work was conducted. That the standards and rules given are not in any sense final but are subject to further consideration, amendment, and correction is emphasized.—G. N. T.

INDUSTRIAL SURGERY

SOME PROBLEMS OF INDUSTRIAL SURGERY. *W. L. Finton. Jour. Mich. State Med. Soc., March, 1923.*

It is of the greatest importance to be courteous and kind to injured workmen, for such treatment insures a control over the patient that is well worth while in the future handling of the case. When the time comes to tell the patient that he is able to return to work, he will follow instructions instead of malingering. Another point worth noting is to tell the patient definitely when to return for subsequent office or hospital dressing. Resentment is easily aroused by failure to do this, and the patient does not ask for the next appointment. When the wound does not do well the patient feels that he has had too early a dismissal. X-ray examinations are not made often enough. In addition to fluoroscopy where indicated, plates should be made of important fractures before the fracture is reduced, soon after it is reduced, at the end of six or seven days, and again at the end of three or four weeks when union should be fairly well established. In addition, if the patient complains of acute pain during immobilization, the parts should be carefully examined and another X-ray made. All contused injuries to hands or feet should be X-rayed if there is the slightest doubt as to the extent of the injury. It should always be borne in mind that the goal of the industrial surgeon is the restoration of the worker to his place in industry. Physiotherapy is necessary after the fracture is well united and this should be under the physician's direction. The length of time that a fracture should be completely immobilized is growing less. At the end of ten or twelve days careful passive motion of adjacent joints and gentle massage may be begun in practically all cases.

Health service in industry looms on the horizon. It consists of a physical examination of employees and in many cases of a medical service or medical clinic at the factory. The purpose of the examination is to classify physical defectives and to place applicants where they can work with the least hazard to themselves, for the best interests of the company, and with the least danger to fellow workers.—G. N. T.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

A STUDY OF THE COMPARATIVE PHYSIOLOGICAL COSTS OF DIFFERENT METHODS OF WEIGHT CARRYING BY WOMEN. *E. M. Hewitt and E. M. Bedale. Ann. Rep. Chief Inspector Factories, 1923, pp. 106–122. Cmd. 1920.*

The subject of weight-carrying in industry has attracted much attention, and in France standards of weights which it is permissible to carry have been fixed; but the present study is the first attempt to approach the matter scientifically. The investigators set themselves to determine, by the Douglas-Haldane method, from the carbon-dioxide output and oxygen consumption the energy expended in carrying weights by various methods. A load was carried (*a*) in a tray held in both hands; (*b*) in a tray held in both hands with the weight taken off the arms by a shoulder strap; and (*c*) distributed on a board which was carried on the

left shoulder. Weights of 20, 30, 40, 50, and 60 pounds were used. A circuit of 100 yards was walked unloaded and loaded at a pace of 75.2 meters per minute. Samples of expired air were taken every twenty minutes, and consisted of air expired during one loaded and one unloaded circuit. The basal metabolism of the subjects was determined at rest and when walking unloaded; the increments when loaded were then taken as the cost of weight-carrying. The results obtained are embodied in a series of tables and their trend is manifested graphically by diagrams. Measured in terms of oxygen cost per horizontal kilogrammeter, for weights from 20 to 30 pounds the method of carrying seemed to be a matter of personal choice and convenience. At 40 pounds either dividing the weights or carrying on the shoulder was more economical than carriage on a tray with or without the shoulder strap. At 50 pounds shoulder carrying was cheapest, with the divided load or tray with shoulder strap second. The experimental work here recorded is excellent, but the report suffers from lack of a concise statement of the conclusions arrived at, and from the inclusion of a discussion of effects on health of weight-carrying which there is nothing in the study itself to justify.—E. L. C.

Industrial Fatigue in Women. *W. G. Fralick. Med. Times, Sept., 1923, vol. 51, pp. 215–217.*

A careful inventory of therapeutic resources for the treatment of disturbances of the nervous system due to fatigue, whether mental, physical, or both, discloses the principal remedy as rest. The rest room is now an important adjunct of industry, but its recuperative value is probably only physical. A subject calling for serious consideration is the loss of time by employees in industrial establishments from intercurrent conditions affecting the nervous system, due to fatigue and loss of sleep.

In the case of telephone operators, physical strain has been minimized but the nature of the work has a provocative effect upon the nervous system of the worker resulting in serious fatiguing effects on the delicately adjusted nervous system of woman. While women can be protected from the deleterious effects of long hours, unhygienic surroundings, and other harmful working conditions, the onslaught on the nervous system cannot be prevented in occupations where the personal equation cannot be eliminated.

Conditions affecting the stability of the nervous system of women in industry also include (*a*) the necessity for single women to contribute to the support of their families; (*b*) the necessity for mothers to become wage earners in order to support their children; (*c*) the high tension demands in recreations; (*d*) the exacting demands of modern dress; (*e*) prolonged courtships with their attendant indecisions and psychoneurotic demands; and (*f*) the period of readjustment in which we are now living as the result of the war.

Two principal classes of remedies are at hand to counteract the evil results brought about by industrial fatigue. The first is fatigue elimination and periodical rest during employment. This has received considerable study, notably at Swarthmore College, where a fatigue survey has laid the foundation for scientific study of the subject, and has awakened wide interest among engineering students. The second is sleep, free from external irritation. It may be induced by the time-honored method of a hot drink just before retiring, but in most cases a light sedative such as bromide is indicated.—G. N. T.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

Pathologic Changes Produced in Those Rendered Unconscious by Electrical Shock and Treatment of Such Cases. *B. Spilsbury. Abstr. as follows from Arch. Radiol. and Electroth., March, 1923, vol. 27, p. 316, in Jour. Am. Med. Assn., June 16, 1923, vol. 80, p. 1810.*

The most reasonable explanation of deaths occurring from electric shock, Spilsbury says, is that they are due to a sensory stimulation causing paralysis of the respiratory center. This justifies the use of artificial

respiration. Certainly, there must be some cases—and there might be many—in which death is only apparent, and in which real death only supervenes from the lack of some means of carrying on the essential function of the body.—K. R. D.

PATHOLOGIC CHANGES PRODUCED IN THOSE RENDERED UNCONSCIOUS BY ELECTRICAL SHOCK AND TREATMENT OF SUCH CASES. *S. Jellinek. Abstr. as follows from Arch. Radiol. and Electroth., March, 1923, vol. 27, p. 316, in Jour. Am. Med. Assn., June 16, 1923, vol. 80, p. 1810.*

From the point of view of time four types of death are recognized by Jellinek: (1) instant death (*décès instantané*): (2) slow death (*décès lente*); (3) interrupted death (*décès interrompu*); (4) retarded death (*décès retardé*). From the point of view of mechanism, or succession of disturbances that follow on the electric shock, four types can again be recognized: (1) death by shock; (2) death by excessive irritation or paralysis of nervous system; (3) death by paralysis of the heart; (4) death by paralysis of the respiratory system. Many victims, rendered unconscious and apparently dead for the longest time, make a recovery, showing that the lesions are not so severe as to make recovery impossible. Artificial respiration should be resorted to at once as it is of the greatest importance, not only for the lungs, but also for the heart and its circulation.—K. R. D.

WOMEN AND CHILDREN IN INDUSTRY

INFANT MORTALITY AND EMPLOYED MOTHERS. *Jour. Am. Med. Assn., March 31, 1923, vol. 80, p. 948.*

New evidence bearing on the influence of the industrial employment of mothers on infant mortality has recently been published by the U. S. Department of Labor. The evidence, which relates to births in Baltimore, indicates that the mother's employment away from home either preceding confinement or during the infant's first year of life is detrimental to the child's health. The employment of mothers during pregnancy is associated with a high stillbirth rate, a high premature birth rate, and a high mortality rate during the first month of life. The stillbirth rate among mothers who were employed in industrial pursuits during the year preceding confinement was more than twice as high as that among mothers who were not so employed. Of the live births to mothers employed, 6.2 per cent. were premature, as compared with 5.7 per cent. to mothers not employed. The mortality rate during the first month of life was 77.3 for each thousand among babies of mothers employed or nearly twice the rate, 39.9, among babies of mothers not employed.

That the employment of a mother, if continued until a short time prior to the confinement, is especially harmful is confirmed by this new evidence. Nearly 40 per cent. of mothers employed away from home worked until within two months, and 25 per cent. until within two weeks, of confinement. The employment of mothers too soon after confinement also appears to be a factor in the infant mortality rate. The mortality rate among babies included in this study whose mothers were employed away from home during the babies' first year of life was one and one-half times the rate among babies of mothers not employed.

Breast feeding is denied the baby whose mother works away from home. A much larger proportion of infants of mothers employed away from home were artificially fed than of those whose mothers did not work. That artificial feeding has serious consequences is apparent. The mortality among artificially fed babies averages between three and four times that among breast-fed babies.

That the small earnings of the father are chiefly responsible for the employment of the mother is shown by the contrast between the several income groups in respect to the proportion of mothers employed. Of mothers in families in which the fathers earned less than $450, 29.2 per cent. were gainfully employed away from home during pregnancy, while 1.2 per cent. of the mothers in families in which the fathers' earnings were $1,250 or over were employed at that period. The contrast is equally striking in the case of employment following confinement. Of the mothers in homes in which the fathers' earn-

ings were less than $450, 22.1 per cent. were gainfully employed away from home during the infant's first year of life, as compared with only 0.6 per cent. of the mothers in homes in which the fathers' earnings were $1,250 or over.

Previous reports of the Children's Bureau on infant mortality have shown a definite connection between income and infant mortality. As the income increases, the infant death rate decreases. This Baltimore study, based on a larger group than the previous studies, permits a closer analysis of the single factor of employment of mothers. The importance of this factor may be realized from the fact that even within the same income groups the mortality rate is higher for babies whose mothers are employed outside the home.—K. R. D.

THE WELFARE OF CHILDREN IN BITUMINOUS COAL MINING COMMUNITIES IN WEST VIRGINIA. *N. P. McGill. U. S. Dept. Labor, Children's Bur., Pub. No. 117, 1923, pp. 77.*

This is a report on conditions in Raleigh County, West Virginia, a region selected as typical of many of the bituminous coal mining districts of the Appalachian Mountain system. In all, 645 families, with 1,965 children, were interviewed. The great majority of these families were native white.

A rather depressing picture of home conditions is painted. Mining towns are described as isolated, entirely owned by coal-mining companies, even to roads and churches in some instances, and usually poorly equipped with sanitary facilities. The houses are built of flimsy materials, inadequately warmed, and badly out of repair. Only fifty-two of the families interviewed have baths in their houses, and these families are chiefly those of mine executives. Overcrowding is evidenced by the fact that in 40 per cent. of the homes there are three or more persons to each sleeping room. Water is usually piped from a central source and distributed from hydrants. Regular analysis of water is uncommon. Most families use privies, commonly of the dry open-back, surface type. Garbage is fed to hogs or dumped into creeks or hollows. Flies and mosquitoes abound, and screens are rare.

The mountain coal camps have few opportunities for work of any kind to offer boys or girls under 16. As industry is not diversified in these regions, girls find nothing to do aside from housework, and boys when of legal age turn to the mines for work. The standard working day for both boys and men is eight hours. Accidents are frequent, as shown by the fact that of fifty-two boys who had at some time worked regularly ten had sustained some injury while at work, and one boy had been twice injured. Only four of the ten children had received compensation, according to statements made by the boys' families. Injuries reported included split fingers; bruised, lacerated, and burned legs; injured knees; injured backs; broken limbs; and hernia.

Aside from the insanitary conditions already noted, medical service is also open to criticism. The custom is for physicians to be employed by the companies and paid by assessments from the employees' pay. Complaints of unsatisfactory medical service are frequent. No company physician had, at the time the investigation was made, attempted any propaganda for the prevention of disease and the preservation of health. Three hospitals were available, however, and one public health nurse was at work. Children's health conferences, in charge of a physician from the Children's Bureau, were conducted in mining communities in the county and had met with cordial response from company and union officials, teachers, clergymen, and others. The defects found demonstrate great need of preventive work.—G. N. T.

CHILD LABOR. OUTLINES FOR STUDY. *U. S. Dept. Labor, Children's Bur., Pub. No. 93, 1923, pp. 63.*

This is an invaluable book of reference for all students of the subject. Six outlines of study are given which are intended to present in simplified form the outstanding features of the child labor problem. They furnish an approach to the subject, indicate a method of study, and put into easily available form material from many widely scattered sources. This material is not to be regarded as complete or final, the legal and statistical matter being subject to continual revision. It reveals painstaking research, however, on the part of a large number of collaborators. The subjects of the six outlines are as follows:

1. History of the movement for the prohibition and regulation of child labor.

2. Present extent and distribution of child labor in the United States.

3. The causes, social cost, and prevention of child labor.

4. The present legal status of child labor in the United States (Jan., 1923).

5. Vocational education and vocational guidance in the United States.

6. Minimum standards for children entering employment.

Information on each subject is summarized under appropriate headings and subheadings, which are followed by an extended list of reading references.—G. N. T.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

Report of Advisory Committee on Atmospheric Pollution on Observations in the Year Ending March 31, 1922. *H. M. Stationery Office, 1923, pp. 42.*

Information is given of observations made at a number of stations scattered over England and Scotland. The amount of atmospheric pollution is expressed as grams per square decameter (metric tons per hundred square kilometers) of insoluble matter (including tar, other carbonaceous matter, and ash) and soluble matter (including sulphates, chlorine, and ammonia). The highest records for total solids come from Rochdale which may be taken as a sample of industrial Lancashire, a county with an unduly high mortality from bronchitis and pneumonia. The atmospheric pollution for this station is estimated to be due 15 per cent. to dust, 66 per cent. to factory smoke, and 19 per cent. to house smoke and other sources. This estimate is arrived at by comparing records obtained under ordinary conditions with those obtained when the factories ceased work during the coal strike of 1920. The effect of the coal shortage in 1921 and of foggy weather is well exhibited by diagrams. Except during a period of continued fog, each day's pollution seems to clear away by midnight; in Rochdale it is at a maximum between 8 and 9 A.M., and in London at about 10 A.M., but on Saturdays it is rather earlier, and on Sundays as late as 11 A.M. A description of Owens' jet dust-counter (which appeared in This Journal, 1922-1923, *4*, 522) is given and also certain conclusions drawn from its use by Dr. Owens. These are: (1) The air passages are not an efficient dust filter, since in quiet breathing 2.5 to 7 per cent. of inspired dust reaches the depths of the lungs, and in deep breathing over 20 per cent.; (2) when air from the depths of the lungs is dust free it is due to deposition of contained dust in or near the alveoli; (3) dust carried in during quiet breathing can be removed by ciliary action; but (4) dust carried in during deep breathing, sneezing or yawning, is drawn past the ciliary mechanism provided for its removal, and it is this dust which is responsible for bringing about disease; (5) nose breathing does not protect against dust.

The article concludes with a useful bibliography on the measurement of dust.—E. L. C.

Factory and Workshop Lighting. *P. M. Baker. Abstr. as follows from Indust. Welfare, May, 1923, pp. 119-123, in Am. Management Rev., June, 1923, vol. 12, p. 19.*

This is rather an interesting discussion on the vital subject of factory lighting. Special emphasis is laid on the relation between lighting and accidents and health.—M. C. S.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Optical Service in Industry. *Jour. Am. Med. Assn., June 23, 1923, vol. 80, p. 1870.*

A committee appointed by the New England Conference of Industrial Physicians to investigate the question of optical service as a part of the general medical service in industry reports the following conclusions:

As to the use of cycloplegics, the majority of ophthalmologists consulted, all of whom have access to all methods of refraction, consider the use of homatropin or atropin essential in determining the refraction of the eye. On the other hand, the majority of optometrists consulted, who for the most part are

not legally qualified to use cycloplegics, claim that their use is not essential in determining the refraction of the eye.

If refraction is regarded merely as one part of industrial eye service, the better eye service, as a whole, which it is possible for an ophthalmologist to render, is indisputable—even by optometrists.

It is believed that an optometrist can render useful service in industry if he will acknowledge that he is not legally qualified to refract all eye cases satisfactorily, and will be on the alert to seek adequate medical aid when his refractive resources are unavailing or when independent eye disease seems at all likely. In addition, and in accordance with the attitude of the American Medical Association and of some optometrists, he should be willing to act under suitable medical supervision and responsibility.

The best interests of industry in the examination and treatment of the eyes of workers would appear to be served by the following alternatives, presented in the order of their value:

1. Employ a full-time or part-time ophthalmologist to handle practically all the eye service.

2. Employ a part-time ophthalmologist, who will do all or part of the refraction work, or who will be available for consultation by the full-time or part-time optometrist who is doing the work.

3. Employ a full-time or part-time optometrist, who will act under suitable medical supervision and responsibility.—K. R. D.

Morbidity Studies as an Aid in Preventing Illness among Miners. *R. R. Sayers. U. S. Bur. Mines, Rep. Investigations, Serial No. 2453, March, 1923.*

A statistical report showing the value to mining companies of inaugurating a system of morbidity records.—P. D.

Restoring the Injured Worker to Health and Efficiency. *H. T. Martin. Nat. Safety News, July, 1923, vol. 8, pp. 45-46.*

This is a short article dealing with the relation between employer and employee at the time of injury. Both the physical and the mental factors of the treatment of the injured worker are considered.—R. M. T.

Medical Department Has Wide Scope. *J. M. Kelley. Hosp. Management, Aug., 1923, vol. 16, pp. 62-63.*

In May, 1923, M. Born & Company of Chicago, wholesale custom tailors employing 1,000 persons, opened a medical advisory department and dispensary. The medical department consists of a nurse's office, a dispensary, a rest room, equipped with two hospital beds, and a supply room. These rooms are airy, well-lighted, and fully equipped to meet the needs of industrial injury and illness.

Each department sends a list of absentees to this department every day. If the employee is absent two days, a nurse investigates the case by telephone; advice is given if the condition is of a minor nature, but where there is doubt about the mildness of the case the patient is urged to call his or her family physician. Upon return to work the patient is referred to the medical department before resuming duty. All applicants for employment are subjected to an examination, in order that they may be placed where they can accomplish most. These examinations are a protection to the employee, in that they keep out infectious persons; and to the applicant, because they serve as a spur to the correction of the defect. A card file is kept of all treatments given in the department, and incipient tuberculosis cases are placed under observation.

The advisory phase of the work of this department is a big factor in the conservation of the health of the employees and their families. The attitude of the nurse toward the employee is that of friend and co-worker, so that the workers are frank and free in their statements to her. Employees are encouraged to call, and feel that the department is for their use and benefit. They are taught the advantage of early treatment in forestalling serious illness, and assistance is given them in working out problems which are a source of trouble. Such a department as this produces healthier employees, hence higher efficiency, better workmanship and better attendance; moreover, the lessons learned in the department are practised in the homes of the employees, and are passed on to the neighbors, producing better hygiene, better housekeeping, better habits, and contented workers.—M. A. T.

HEALTH SERVICE FOR 32.000 WORKERS. *Hosp. Management, July, 1923, vol. 16, pp. 62, 63, 68.*

The Hawthorne works of the Western Electric Company, Inc., Chicago, employs about 32,000 people and has made elaborate provision for the physical welfare of its employees. The medical department consists of a chief surgeon, a works surgeon, and eighteen physicians who are on a part-time basis, as well as a superintendent of nurses and eighteen assistants who are registered graduate nurses. The staff of the hospital also includes twenty-four clerks.

All emergency cases are treated in the hospital building. There are no first-aid kits or similar facilities, since experience has shown that such equipment was carelessly handled and frequently resulted in aggravating an injury. The hospital building has six beds—three for men and three for women. Besides well-appointed examining rooms there are treatment and operating rooms, a completely equipped laboratory, an X-ray department including a fluoroscopic unit, and a diet kitchen. A technician is in charge of the laboratory and an experienced nurse has the X-ray work. The hospital is on a twenty-four-hour basis but ordinarily no patients are kept there after their condition will permit removal to their homes or to a Chicago hospital. Further treatment is left to the family physician who is asked to fill out a medical certificate to be used as a basis for payments under a sickness and accident benefit plan of the company. Complete records are kept by the company's medical department. On this department also falls the burden of physical examination of applicants and employees, 2,200 having been examined in one week.—G. N. T.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

SEATING SURVEY IN THE GARMENT INDUSTRY. *T. Wolfson. Nation's Health, March, 1923, vol. 5, pp. 165-168.*

This article reports the results of a survey of seating conditions in 250 shops of the Ladies Garment Industry—shops in which were employed at the time of the survey 2,528 machine operators, 1,774 hand finishers, and 734 pressers.

The author discusses the inadequate and unsuitable seating contrivances, and the improper lighting arrangements found in the shops studied, and discusses their effects upon the health of the worker. She concludes with the following suggestions as to proper seating:

1. The seat should be about 16 inches wide, slightly saddle-shaped to fit the back and seat of the worker;

2. Front edge of seat should not cut into knees and thereby impair circulation; it should be rounded and not sharp;

3. Chair must be adjustable to the height of the worker;

4. Back support must be slightly curved and give support to back of worker, preferably a little below the shoulder; it should be adjustable;

5. Chair must be comparatively light so that it can easily be moved;

6. Chair should have firm base and not tip backward as worker leans back;

7. There should be no bars at the base of the chair to cut the operator's feet or ankles as he leans forward.—K. R. D.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

INDUSTRIAL PSYCHIATRY. *J. D. Ball. Am. Jour. Psychiat., 1921-1922, vol. 1, pp. 639-677.*

Without attempting to define industrial psychiatry, the author points out the future for the psychiatrist in industry. He believes that psychiatry should not be considered a "weeding out" process, but a method of conservation. The psychiatrist who is to enter the industrial field, therefore, needs to widen his range of vision by a full consideration of industrial environment and wage schedules.

Psychiatry offers the only means of solving industrial personnel problems. Mechanical

devices and machinery have had the attention of the engineering groups, but for the most part the worker, under unstudied conditions, and often under undue physical and mental stress, has been permitted to become hypersensitive and abnormal in reaction. As the employer is usually as blind to the situation as the employee, the duty of the psychiatrist is to seek a comprehension of the situation from a psychiatric viewpoint. This is not a philanthropic move in industry, but an advanced business method, a method which applies to the whole personnel, from executive to roustabout.

The organization and function of the personnel department, therefore, must be effected by the psychiatrist as director of the department. He should have available consultants in neurology, psychology, and medicine. A special secretary may be needed, and the personnel work should be fully co-ordinated with the departments of engineering and employment management.

The psychiatrist will be especially concerned in group and individual tests, in work and job analysis, in studies of terminations, distribution of labor, and in the observation of special situations.

Dr. Ball advocates for all employees a scoring method after the United States Army plan for rating officers, the score for each individual based upon ten qualifications: (1) at least average intelligence; (2) good physical condition; (3) good nervous condition, to be determined by neurological examination; (4) good mental condition, to be determined by psychiatrical examination; (5) personality characteristics of special kind; (6) speed; (7) accuracy; (8) good reasoning ability; (9) good auditory memory; and (10) good visual memory. The score for each person is the total number of points obtained. This is not a percentage score but is based upon qualities or groups of qualities whose values are determined on the basis of the job requirements.

A series of typical cases is given, showing the method of recording, together with the recommendations either as to placement or as to hygiene, mental or physical. Another series of cases is reported to show the value of such studies as applied to studies in job terminations. The figures given on terminations constitute an actual study made from one of the departments of a large manufacturing plant in San Francisco where in a three-months' period the lack of diplomacy on the part of a single foreman cost the firm in avoidable labor turnover nearly $8,000.

The work reported by Dr. Ball is the result of three years' study of industrial problems in the respective plants of a shipbuilding corporation, a calculating machine manufacturing company, a large soap manufacturing company, and a large oil company. He concludes from these studies that: (1) Every large industrial organization should have a psychiatrist on its staff. (2) Groups of small industrial organizations should seek the services of a consulting industrial psychiatrist. (3) Labor unions should welcome the advice and guidance of an industrial psychiatrist. (4) Every university should establish a department of industrial psychiatry. (5) Personnel departments should be under the directorship of industrial psychiatrists.—M. C. H.

PERSONNEL WORK IN FACTORIES. *L. C. Odencrantz. Pub. Health Nurse, Aug., 1923, vol. 15, pp. 395-400.*

Welfare work was first undertaken by employers about forty years ago. The motives on the part of individual employers were varied but the outstanding feature was the recognition of the individual in industry as opposed to the old conception of labor in the mass. The welfare work was at first limited in scope and covered activities such as neighborhood classes, recreational facilities, and visiting nurse services, which have since been taken over largely by the community. The functions of the welfare worker are today more concerned with the relation of the worker to his job. Personnel work has thus acquired great importance.

The appointment of a personnel worker usually means, or ought to mean, a centralized employment department for interviewing all new applicants, recruiting, hiring, and discharging workers. If the power of discharge rests with the personnel department rather than with foremen, labor turnover is reduced through the opportunities of explanation, getting at the facts, and making adjustments when disputes arise. A definite person in the management has a definite job of knowing the attitude of the workers and

their probable reaction to changes in methods of work or in plant design. The same persons must pay close attention to the proper selection of workers for given jobs, and must conduct follow-up work to reduce the number of misfits to a minimum. The new worker must be introduced to the foreman and informed of the customs and policies of the plant. Systematic training of new men under competent instructors must be provided for, methods for watching varying abilities devised, and fair plans for promotion made to avoid losing good workers. Standards of production must be worked out and conditions adjusted before they become grievances.

All these activities should result in better relations between employers and employees, with greater financial returns to the former and more satisfactory working conditions for the latter. Personnel work has justified itself, though hampered by sentimentality in its early stages. With three masters to serve—the public, the individual employer, and the workers—it has an intricate technic but it is based upon sound economic philosophy.—G. N. T.

Neuropsychiatric Work in Industry. *A. Scott. Ment. Hyg., July, 1923, vol. 7, pp. 521-537.*

The purpose of this paper is to explain how nervous patients are handled when encountered among the employees of the Metropolitan Life Insurance Company, and to show what is accomplished by a specialist working in close contact with employees.

From the standpoint of the company, there are certain situations in which subsequent action is dependent upon the opinion and advice of the specialist. These situations relate to (1) the payment of disability; (2) the question of retirement; (3) the advisability of excusing from overtime work; (4) the changing of vacations after the schedule has once been made up; (5) the possibility of cutting down frequent absences ascribed to ill health when there is no physical disease apparent.

An effort is made to help employees to develop interests and to find outlets for energy other than work. Cases are cited showing how sympathetic appreciation of the patient's problems, often unalterable because of economic or other conditions, points the way to helpful advice.

The author believes that mental hygiene will soon become a regular part of industrial health work.—G. N. T.

Vocational Tests for Dressmakers' Apprentices. *W. Spielman. Jour. Nat. Inst. Indust. Psychol., July, 1923, vol. 1, pp. 277-282.*

A number of girls attending dressmaking classes at trade schools were subjected to (*a*) speed tests, such as threading beads and knotting wool at maximum speed; (*b*) quality tests (such as dividing lines in half without measuring, selecting a line of remembered length from several alternatives, selecting a remembered color from several alternatives) and co-ordination tests; (*c*) a memory test (reproduction after an interval of a real description of a dress), and an observation test (enumeration of details of a dress directly upon its removal). The girls were ranked in dressmaking ability by the mistress and also by each other. The correlations between the rankings and the combined tests referred to were 0.69 to 0.78, while the correlation of tests with general intelligence (Stanford Revision of the Binet-Simon tests) was 0.58, and with visual creative imagination, 0.55.

For other details, and for a table classifying the psychological factors determining the efficiency of dressmakers' apprentices, the original paper must be consulted.—H. M. V.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Standards for Workmen's Compensation Laws. Revised to January, 1923. *Am. Assn. for Labor Legis., Jan., 1923, pp. 12.*

The eighth edition of this pamphlet embodies essential features of a workmen's compensation law based on careful study of the whole question, and of the compensation laws not only of our states but of European coun-

tries. Notable progress has been made in extending laws to cover occupational diseases, in reducing waiting periods to seven days, in raising the compensation scale to two-thirds of wages, and in removing arbitrary limits on medical care.

Recommendations are briefly as follows:

1. The employer should furnish all necessary medical, surgical, and hospital services and supplies as determined by the Accident Board.

2. No compensation should be paid during a period of from three to seven days at the beginning of disability.

3. Compensation for total disability should be 66 2/3 per cent. of wages, with the maximum $25 and the minimum $8 per week.

4. Compensation for partial disability should be based on the degree of disability; maximum $25, and minimum $8 per week.

5. Funeral expenses not exceeding $150 should be paid by the employer.

The widow should be granted 35 per cent. of the decedent's wages until her death or remarriage, with two years' lump sum settlement on remarriage. The widower should receive a like amount if dependent on the deceased, payment to stop on remarriage or death. In addition to the compensation for the widow and the widower, 15 per cent. should be allowed for each child, the total amount for all not to exceed 66 2/3 per cent. of the wages; the payment to children should cease at death, at marriage, or when the age of 18 years is reached. If no widow or widower is left, the compensation should be 25 per cent. for the first child and 15 per cent. for each additional child, with the same maximum of 66 2/3 per cent. Dependent parents should receive 25 per cent. for the first child and 15 per cent. for each additional child. The maximum wages on which death compensation is based should be $37.50, the minimum $12. The total amount of the weekly compensation should not be more than the actual wages.

6. All employments should be included.

7. All personal injuries and occupational diseases contracted in the course of employment should be included except in case of injury occasioned by wilful intention of the employee or of another.

8. Compensation should be the exclusive remedy.

9. Employers should be required to insure their compensation liability.

10. An Accident Board appointed by the Governor with the consent of the Senate should give its entire time to the work; the entire cost to be borne by the state.

11. Simple procedure for the settlement of claims should be provided; appeals should be made only on questions of law and should be carried direct to the highest court.

12. Full and accurate reports of all industrial accidents should be made on standard forms.

13. Rehabilitation of injured persons should be encouraged.—G. N. T.

THE OHIO STATE FUND FOR WORKMEN'S COMPENSATION. *M. B. Hammond. Am. Labor Legis. Rev., Dec., 1922, vol. 12, pp. 210-218.*

There is not in Ohio today a wide-spread demand to take away from the state its legal right to be the sole carrier of workmen's compensation insurance. The most serious defect in the administration of the state insurance fund is to be found in the political interference with the appointments when a change takes place in the state administration. The private insurance companies are mainly responsible for this interference. These private companies are fighting for their lives in other states and the reports of success of an exclusive state fund are a constant menace to them. It is therefore to be considered a tribute to the organized manufacturers and laborers that all efforts made by outside influences to secure modifications of the act have so far failed.—L. A. S.

THE RELATION BETWEEN OBLIQUE INGUINAL HERNIA AND WORKMEN'S COMPENSATION LAWS. *J. M. Wainwright. Arch. Surg., March, 1923, vol. 6, pp. 605-637.*

There is a common belief among social workers, labor leaders, and the general public that most hernias are the result of accidents. The English courts of the last century have yielded more or less to this belief, and our own courts or compensation boards have inherited the impression from them. As a result, according to one authority, over 4,000 cases have been compensated in Pennsylvania in the first three years of its compensation law, "or more than the real cases of

traumatic hernia that have occurred in the Western Hemisphere since Columbus."

The present day medical conception as to the cause of hernia is based upon the connection between oblique inguinal hernia and the unobliterated processus vaginalis. Authorities now agree that true traumatic hernia is of rare occurrence and that oblique inguinal hernia is primarily due to a congenital or preformed sac. The author of this article has made a painstaking search of the literature and quotes English, French, German, Belgian, Italian, and American surgeons, all of whom are in substantial agreement on these points. Traumatic hernia when it does occur is unmistakable, being accompanied by immediate sharp pain localized at the hernial orifice, malaise, weakness, and often syncope; continued work is impossible. On the other hand, most hernias believed to be the result of accident have really been developing for a long period, remaining unnoticed until some strain, by slightly increasing the contents of the hernial sac, brings it to the attention of the patient.

To consider which cases of claim for hernia should be contested and which paid, the author makes the following classification:

1. Hernias by direct external violence.
2. Hernias of effort, Type 1 (French hernia of force). These are hernias alleged to be due to muscular effort and appearing suddenly and immediately, under adequate and convincing circumstances.
3. Hernias of effort, Type 2 (French hernia of weakness). These are hernias alleged to be due to muscular effort and appearing gradually shortly or remotely after trivial effort, and under inadequate or unconvincing circumstances.

Six criteria for determining that a hernia is compensable are noted. They are:

1. The descent of the hernia immediately following the cause.
2. Severe pain in the hernial region.
3. Prostration so that the employee was compelled to cease work immediately.
4. Symptoms of such severity that they were noticed by the claimant and communicated to the employer within twenty-four hours after the occurrence of the hernia.
5. Physical distress so great that the attendance of a licensed physician was required within twenty-four hours after the occurrence of the hernia.
6. A strain or force adequate to bring about the effect.

It is the hernias of effort, Type 2, that cause the greatest numbers of claims for compensation. The author feels that a hernia justly caused by work should be compensated, but he believes that no employer should be forced to pay for an old hernia or for one of the many that develop gradually and happen to give trouble while the man is in his employ. Better instruction of the medical profession and of courts and compensation boards, as well as active, systematic and efficient defense by employers of unjust cases will bring about a much sounder situation.—G. N. T.

TREBLE COMPENSATION FOR INJURED CHILDREN. *E. E. Witte. Am. Labor Legis. Rev., June, 1923, vol. 13, pp. 123-129.*

The majority of compensation laws either expressly provide that they shall not apply to minors illegally employed or they have been so construed by the courts. The thought underlying this has been that injured minors would have the chance to secure a larger recovery by suits at common law than would be the case under compensation. The employer in such cases is deprived not only of the common law defenses, but the fact of employment alone is sufficient to establish negligence on his part. Experience has shown, however, that injured minors have not fared well under this arrangement. Alternative plans are in effect in certain states. One is to put all minors under compensation, making no distinction whether they are employed legally or illegally. Another is to provide treble compensation for minors illegally employed, the employer being primarily liable for the extra compensation; the insurance company paying the extra amount only when the employer is insolvent.

The last method, known as the Wisconsin Plan, has a number of advantages. It has proved a deterrent to the employment of child labor and has acted as an effective penalty for violations of the child labor law. It fixes definitely the amount which may be recovered and eliminates for the employer the disagreeable situation of having to fight the claim of a child injured while illegally employed. It has secured reasonably adequate awards for injured minors without the delay,

expense and uncertainty involved in actions at common law.—G. N. T.

PUBLIC INTEREST CALLS FOR EXCLUSIVE STATE FUND. *Am. Labor Legis. Rev., June, 1923, vol. 13, pp. 151-152.*

The City Club of New York has taken action in support of a measure providing for compulsory compensation insurance against accident in one state-wide fund. An official investigation in the state has revealed underpayments by commercial carriers amounting to over $5,700,000 in a period of four years. Many employees have also found themselves without protection owing to the failure of the employer to insure. Another factor in favor of an exclusive state fund is that the average overhead expenses of stock companies are 30 per cent. greater than those of a state fund would be, the added cost being borne by the public. It is contended that in making accident insurance compulsory the state has in effect levied an occupation tax to provide payment to those disabled in employment, a tax ultimately borne by the consumer. The consumer has a right to demand that the collection of this particular occupation tax shall not be farmed out for private gain. Exclusive state funds are declared to be successful wherever they have been tried.—G. N. T.

REGULATIONS: DANGEROUS AND UNHEALTHY INDUSTRIES. *Internat. Labour Office, Legis. Series, 1922, G. B. 2, Great Britain, pp. 20.*

This pamphlet contains safety regulations issued by the Secretary of State under section 79 of the Factory and Workshop Act, 1901 (1 Edw. 7, c. 22). It covers processes used in india-rubber manufacture, in chemical works, and in wood making. To those interested in the comparative studies of such regulations it offers interesting reading.—G. N. T.

LEGISLATION AGAINST INDUSTRIAL POISONING. *Vienna Letter. Jour. Am. Med. Assn., July 21, 1923, vol. 81, pp. 229-230.*

By order of the ministry for social administration, with which is included the board of health, a series of separate bills, passed by the national assembly some time ago, have been uniformly put in force already. They deal chiefly with prophylaxis against poisoning in certain industries. These are: the manufacture and use of lead and zinc, printing offices and lithographic industries, enamelers, and all workmen handling substances containing poisonous metals. In every working place concerned, a notice must be posted containing instruction of the risks from neglect of clean linen and of the kind of measures that are required from the workmen: the necessity of change of clothing when leaving the factory, of fat in the food, and of early medical examination when certain symptoms occur. A regular examination of factory hands by physicians is compulsory, as well as perfect ventilation of rooms and the provision of apparatus to remove or condense various gases and dust. A daily wet wash of the floor and walls is stipulated when possible. The working dress must be cleaned at least once a week, and sufficient provisions made for bathing and washing by workers in every factory. The transport of raw materials must be so managed that no dust is produced; the loading of the furnace and other machinery must be done with strict observation of hygienic principles, *i.e.*, prevention of dust. Wherever lead is melted or bronze or lead dyes are used, air space of at least 15 cubic meters and floor space of at least 3 square meters must be provided for each workman; in other instances 12 cubic meters and 2.5 square meters are permissible. In cellars or subterranean localities, such work is not permitted. Spittoons must be provided everywhere, and be filled with liquids or moist materials. A first-aid outfit must be within easy reach in every factory, and the foremen must be instructed in first-aid work. In factories producing much dust or noxious gases, the workmen must be advised to wear respirators. Special attention is paid to prophylaxis in regard to children and women. In printing industries and dye factories, children under 17 years may not be employed at the dangerous parts of the work or where poisonous dust is prevalent; women (over 18 years) must have at least a ten-minute rest after each two and one-half hours' work at a machine. Change of work must be provided after one week's occupation at the dye department, or two days without work. No food may be consumed on the working premises. For this purpose, a special well-ventilated space must be set apart. If a person is affected by plumbism or other poisoning arising from his

work, due to faulty observation of the rules on the part of the employer, he must be paid his regular wages, as long as he is kept from work, of course subject to exact treatment. But if the fault or neglect is caused by the laborer, he receives only sick pay. Free treatment is always insured by means of the compulsory "Krankenkasse" (sickness insurance) toward the premiums of which the employer contributes one-third, the employed two-thirds weekly. It is clear that this legislation is a distinct step toward assurance of undisturbed health for the laboring classes, and is the outcome of the present strongly socialistic trend of health authorities. It compares favorably with conditions prevailing in other industrial countries where little or no attention is paid to the well-being of the factory hands, and also with conditions in this country twenty years ago.—K. R. D.

WHERE FEDERAL AND STATE LAWS CONFLICT IN WORKMEN'S COMPENSATION. EDITORIAL. *Boston Med. and Surg. Jour., April 19, 1923, vol. 188, 605-608.*

The Massachusetts Workmen's Compensation Law is not applicable to purely maritime torts or injuries on the navigable waters of the state. A decree of the Supreme Judicial Court in Massachusetts holds that all injuries occurring on land, on docks and wharves and vessels not completed, although riding on navigable waters while in the process of completion, are within the jurisdiction of the compensation statute. A conflict in laws, state and federal, still remains so far as concerns injuries received in strictly maritime risks. The decree is reprinted.—B. C.

REHABILITATION OF DISABLED EMPLOYEES

THE PROBLEM OF OUR PHYSICALLY HANDICAPPED. *P. K. Brown. Arch. Occup. Therapy, June, 1923, vol. 2, pp. 171-178.*

The influx of the unskilled laboring class of Europe into this country ceased with the great war in 1914. Up to that time they were coming at the rate of about one million a year. This vast movement requires a large amount of economic adjustment. At the present time the possible need of conserving labor because of limited supply from Europe, and our duty to our permanently handicapped soldiers have awakened this country to a new responsibility to all classes of the handicapped. Industry cripples annually far more than did the war, and there are also those who are handicapped by diseases, such as tuberculosis, rheumatism, and heart disease. Little has been done to work out a fairly satisfactory plan of subsidy and training except for the blind. This has been worked out by the state and private agencies.

Many large corporations make a special effort to take care of the cripples of their own making through accidents, and of faithful employees who are handicapped through various illnesses. (A chart shows the classified permanent injuries among the Southern Pacific Railroad System employees.) Wage earning is taken as the measure of fitness. Experience shows that the sooner the wound of the body is healed by proper surgical attention, and the wound of the feelings adjusted by reasonable financial settlement, and the injured man returned to some employment, the less he becomes the slave of his handicap.

Tuberculosis presents the most common and difficult problem of economic loss in industry, rarely being discovered until it is too late to be shaken off. Two notable efforts at training of arrested tuberculosis cases are the Reco Shop, supported by the New York Tuberculosis Society, and the Altro Manufacturing Company, the latter chiefly for Jewish patients discharged from among garment workers. France and England have tried agriculture and gardening for these patients. Dr. Alexis M. Forster, after his successful trial of farming at Eudowood Sanatorium, Baltimore, is an ardent advocate of farm colonies for the treatment and training of suitable cases of tuberculosis. The Arequipa pottery making is another case of successful treatment. The real problem of the discharged tuberculous patient is not being met on any highly practical scale anywhere. We can learn a lesson from the method by which the state, the municipality, and the private agencies met this class of handicapped in the allied countries during the war, by lessons taught in the hospitals for cripples.

The main things to be considered are: to be prepared at once to prevent patients from

sinking to the level of their handicap; to have schools established in every community where these people can be studied and helped promptly to develop their remaining capabilities; and to have lodges, benevolent societies, employers and various other agencies unite to form an organization for the care and training of the handicapped.—G. N. T.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

Mortality of Coal and Metalliferous Miners. *E. L. Collis. Brit. Med. Jour., June 9, 1923, No. 3258, p. 972.*

Notwithstanding a general similarity of working conditions, the rates of mortality of different groups of miners differ widely. In coal mining, pneumonia, bronchitis and accidents are responsible for rates of mortality considerably above the standard of all occupied males; diseases attributable to alcoholism and phthisis, however, are less deadly than in the standard population. Considering coal fields separately, the Lancashire rate of mortality much exceeds that in any other field, and is nearly double the rate for Nottingham miners. Inquiry within the industry is needed to get at the root of this, particularly concerning phthisis. Although age distribution of phthisis among coal miners brings it into line with phthisis among workers exposed to silica dust, the unusually low absolute prevalence of the disease needs explanation. Possibly Mavrogordato's work provides the clue. These investigations show that once silica is fixed in lung tissue coal exerts no eliminative effect, but that a prior or simultaneous exposure to coal dust appears to set up a condition inimical to the fixation of silica. Mortality attributable to alcoholism does not follow the general mortality order in relationship to fields but appears to have some connection with the depth of working. The provision of drinking water underground is recommended. Cancer is not an exceptionally important cause of mortality among coal miners.

Respecting tin, lead, and ironstone mining the two former stand out both on account of their excessive general mortality rate and because of the prominence in each of the same disease groups—namely, phthisis, respiratory disease, and Bright's disease. The working of Cornish tin ore generates much dust from the contained and surrounding quartz. The high phthisis mortality rate and age distribution are equivalent to those attributable to silica. It is suggested that the high prevalence of Bright's disease may be due to fibrotic changes in the kidney produced through elimination of part of the soluble colloidal silica produced in the lungs. Phthisis mortality is excessive at Greenside, where veins of lead ore occur in granite, but not at Keswick, where the ore is in limestone. Phthisis among hematite miners appears statistically to resemble fibroid phthisis, and may be due to oxide of iron, but this distribution is not found in iron carbonate miners. Alumina dust, judging from mortality data for slate quarriers, resembles iron oxide and silica in its effect on the lungs. The suggested beneficial influence of coal dust against phthisis incidence is supported by certain interesting facts in the ganister industry. Ganister is a quartzite rock, underlying coal and overlying fire clay. First-grade refractory bricks are made from best ganister, which contains about 95 per cent. of quartzite (nearly pure silica), with the result that the workers suffer from an excessive phthisis mortality. On the other hand, second-grade refractory materials are made from impure ganister which contains veins of fire clay, and though this represents 80 per cent. of pure silica there is no excessive phthisis mortality among the workers. The theory is put forward that the particular protective substance contained in the coal is washed down into the underlying fire clay and thus renders second-grade dust innocuous. An interesting point in connection with tuberculous silicosis is its low power of infecting contacts (wives and children) who are themselves not exposed to silica dust.—W. F. D.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

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GENERAL

NOTES ON INDUSTRIAL MEDICINE IN GREAT BRITAIN. *T. M. Legge. Nation's Health, June, 1923, vol. 5, pp. 371-373.*

The author discusses briefly some of the problems in industrial medicine which have recently presented themselves in Great Britain.

Lead poisoning in the new industry of ship-breaking results from the lead fume produced as an oxyacetylene flame is used to cut through the armor plating of battleships which are being scrapped. The flame at a temperature of between 1,450° and 1,600° C. causes volatilization of lead from the paint on the plates and from a layer of red lead at the back of the plates. Aspiration of the flame during the process has shown an amount of lead as high as 49 mg. per 10 cubic meters of air. Workmen are affected after exposures as short as three weeks.

Men employed in this oxyacetylene cutting, when working on plates which have been galvanized, suffer also from attacks of malaise and shivering coming on some hours after leaving work—attacks showing all the characteristics of brass founders' ague. In this work on galvanized plates, a white deposit of zinc oxide appears around the path of the flame, and in estimations of the amount of zinc in the fume given off, 64 mg. in 10 cubic meters have been found.

The author goes on to discuss recent reports of committees investigating the dangers from lead paints and presents a leaflet

on "Lead Poisoning among Printers—How Caused and How Best Prevented" (reprinted in THIS JOUR., June, 1923, 5, p. 28), which he prepared at the request of the Joint Industrial Council of the Printing and Allied Trades for distribution among its members.

A brief account is given of the treatment of anthrax and of the Duckering process for disinfecting wool and hair suspected of containing anthrax spores and organisms.

The author comments on the production of cancer by specific forms of irritation, emphasizing the recently demonstrated occurrence of this condition from contact with lubricating oil. Of 141 cases of scrotal epithelioma treated in the Royal Infirmary in Manchester during the last twenty years, the occupation in sixty-nine was mule-spinning.—K. R. D.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

CIRCULATORY SYSTEM

HEALTH AND INDUSTRIAL PROBLEMS OF HEART DISEASE IN MIDDLE LIFE. *F. Brush. Arch. Occupational Therapy, Oct., 1923, vol. 2, pp. 335-345.*

This article deals with the problems of persons suffering from heart disease between the ages of 30 and 65 who must practise what is aptly termed the art of subnormal living. Too little is being done to help such persons. A mass of valuable fact and experience is being gradually accumulated through the efforts of social workers, employers, insurance carriers, unions, and life-extension examiners. Country convalescence has become a recognized essential in any improvement regimen for adult heart disease, but arrangements for it often prove difficult. The real problem is to find suitable employment for cardiac cripples. When of fair workable power and reserve they can be made wage-earners in the industrial world without vocational schools or special factories simply by selecting suitable work for them. Vocational training when practised must be with the worker on the job and drawing his pay envelope—one of the best prescriptions for middle-grade heart disease. Periodic health examinations in middle life, involving as they do frequent overhauling of the human machine, will bring about all-round betterment of the adult cardiac population. Public education, especially through the press, will help to effect prompt recognition of trouble and correction of incipient circulatory failure. A national heart association is needed to exert influence upon many of the broader social and legal questions involved.—G. N. T.

LIMITATION OF EFFORT IN HEART DISEASE. *C. Wilson. Abstr. as follows from Brit. Med. Jour., June 9, 1923, vol. 1, p. 962, in Jour. Am. Med. Assn., July 28, 1923, vol. 81, p. 338.*

People sometimes die suddenly of heart disease who have never had a symptom, and some such cases have been examined within a few months or weeks of death by the ordinary methods without any abnormal sign being discovered, or anything to suggest that an examination by electrocardiograph was indicated. Wilson has seen many sudden deaths from heart disease, but only two of this kind in which a necropsy was made. In one case there was a ruptured aneurysm of the left ventricle, while the other showed degenerated heart wall, especially on the right side. A second source of error is that occasionally patients live for years whose early death is predicted. When the stethoscope had revealed the various heart sounds, and their meaning became gradually elucidated, conclusions based on the integrity of the valves dominated cardiology for many decades and led to views many of which are today discredited. With the advent of the polygraph and the electrocardiograph, the myocardium has come into its own, and it now dominates. Each case must be looked at all around; no single sign should be given undue weight; but if there is any one point which may be allowed to override the others it is the one to which least attention is often paid—and that is the physiologic capacity of the heart, as proved, not so much by set tests, as by careful inquiries and cautious experiment as to the individual patient's capacity for effort in the ordinary calls of life.—C. K. D.

ECONOMIC ASPECT OF HEART DISEASE. *R. O. Moon. Abstr. as follows from Brit. Med. Jour., June 2, 1923, vol. 1, p. 922, in Jour. Am. Med. Assn., July 28, 1923, vol. 81, p. 337.*

The exercises applied in the convalescent-reconstructive stages of heart disease, Moon points out, have three main purposes: (1) to improve the general condition (nutritional, muscular, and organic); (2) to increase the cardiac reserve power; (3) to lessen the introspective and neurotic tendencies, for the psychoneurotic element is very important in many forms of heart disease. It is a good thing for the exercises to stimulate and merge into everyday physical and social activities. Though formal gymnastics are helpful in inspiring courage and getting hold of the mild slacker and neurasthenic, after six years' observation of 3,000 heart convalescents, no regimen has given such all-round satisfaction, safety, and success as the old farm regimen where a total of nearly 500 cardiacs, boys and young men were given essential freedom of play and work—of course, under reasonable regulations of rest, etc. Dancing has been found to be a most useful exercise; it certainly ranks high in mental therapeutics. Convalescent cardiac patients with but a moderate degree of cardiac reserve may begin cautiously to dance and then go on to considerable indulgence with safety and benefit. Patients are often under the impression that dancing is necessarily a strenuous and exhausting exercise, whereas short period dancing, shuffling with little weight lifting, is one of the mildest exertions. Dancing gives an additional and readily available test of the cardiac reserve and of progress. Among all the thousands of dancers there have been only twenty collapses or partial collapses or partial faints, and these were found to be mainly hysterical or neurotic.—C. K. D.

BLOOD CONCENTRATION CHANGES IN EXTENSIVE SUPERFICIAL BURNS, AND THEIR SIGNIFICANCE FOR SYSTEMIC TREATMENT. *F. P. Underhill, G. L. Carrington, R. Kapsinow, and G. T. Pack. Arch. Int. Med., July, 1923, vol. 32, pp. 31-49.*

"In extensive superficial burns the blood becomes highly concentrated. This increased concentration of the blood is regarded as an important factor in the development of many of the clinical signs and symptoms characteristic of burns. The recognition that in extensive burns the blood becomes highly concentrated leads to a rational method of treatment to obviate the untoward symptoms.

"Restoration of normal blood concentration by adequate forcing of fluid is accompanied by marked evidences of improvement and the development of the usual sequels (delirium, unconsciousness, gastro-intestinal disturbances, albuminuria, hemoglobinuria) of extensive burns is checked. The vast majority of badly burned patients ultimately recover.

"Decrease of blood concentration to a point near the normal limits is, therefore, of prime importance in the systemic treatment of burn cases. The determination of the degree of blood concentration may be regarded as an index of the patient's general condition, and will also indicate the extent to which fluid should be forced. The relationship of blood concentration to fluid interchange in inflammatory reactions, with special reference to blood composition and circulatory failure in burns, is discussed by illustrative cases."—M. C. S.

BLOOD PRESSURE IN RELATION TO TYPES OF BODILY HABITUS. *J. W. Larimore. Abstr. as follows from Arch. Int. Med., April, 1923, vol. 31, p. 567, in Jour. Am. Med. Assn., July 28, 1923, vol. 81, p. 333.*

Larimore analyzed the blood pressure for its relation to bodily habitus in a group of 417 factory workers. The sthenic habitus was accompanied by a higher blood pressure than the asthenic habitus. The pressure accompanying the hyposthenic habitus was intermediate.—K. R. D.

RESPIRATORY SYSTEM

PULMONARY CANCER IN MINERS. COMMITTEE REPORT. *Abstr. as follows from Ztschr. f. Krebsforsch., June 15, 1923, vol. 20, p. 209, in Jour. Am. Med. Assn., Aug. 25, 1923, vol. 81, p. 702.*

This is the report of a special committee that has been investigating lung cancer in coal miners in Saxony, and the unusual prevalence of cancer of the lungs at Dresden. The Schneeberg cancers seem to develop from an occupational predisposition, but there is no uniformity in the structure.—K. R. D.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

METHYL BROMID INTOXICATION. *A. Cade and P. Mazel. Abstr. as follows from Bull. Soc. méd. d. hôp., May 18, 1923, vol. 47, p. 722, in Jour. Am. Med. Assn., Oct. 13, 1923, vol. 81, p. 1319.*

Cade and Mazel's patient, aged 32, working in a factory where chemicals were manufactured, for a month had been affected by the vapors from methyl bromide distillation before a leak in the tank occurred. He tried to stop the leak with cotton and left the works an hour later feeling normal. Reaching home he ate a little without appetite and lying down felt a sudden pain in the neck, which was relieved by medicine, and he had a good night. Sixteen hours after the inhalation his fingers and legs became useless; he had diplopia with indistinct vision, and he was unable to give his name either orally or in writing. Paresis of the limbs, more marked on the left side, set in with violent pains in the legs, and marked motor inco-ordination, which was increased by closing the eyes. The authors have collected nine other cases of methyl bromide poisoning, all of occupational origin. The symptoms in all were nervous: staggering, dizziness, sudden headache, and visual disturbances, either singly or in combination. After a remission of a day or two, the symptoms returned, with muscular weakness or inco-ordination, sometimes with somnolence or lipothymia, and in the graver cases with sensorimotor polyneuritis. In a second case, the man, aged 59, had been engaged at times for thirty-two years in the manufacture of antipyrin; he had had four attacks of mild methyl bromide poisoning, with complete recovery in the intervals. In all the cases, the disturbances from the methyl bromide subsided in from one to fifteen days, or a few weeks in the graver cases, except in the two fatal cases reported in which epileptiform attacks occurred and merged into a terminal coma in a few hours. In all the cases the acute poisoning was the result of the breaking of some part of the apparatus, with consequent escape of the fumes.—K. R. D.

OCCUPATIONAL INJURY FROM SULPHUR DIOXID. *J. Strebel. Abstr. as follows from Schweiz. med. Wchnschr., June 7, 1923, vol. 53, p. 560, in Jour. Am. Med. Assn., Oct. 13, 1923, vol. 81, p. 1320.*

Strebel has seen a number of cases of superficial punctate central keratitis among the spinners and weavers in a local factory. It may be accompanied by ciliary neuralgia, and in two cases there was hemorrhagic gastritis or acute nephritis. The gas reaches the eyes through the lacrimal passages when goggles are worn; Strebel has devised a mask with goggles and a zinc and charcoal filter which is proving effective protection.—K. R. D.

POSTMORTEM FINDINGS IN TWO CASES OF HYDROCYANIC ACID GAS POISONING. *G. R. S. Thomas. Abstr. as follows from Lancet, June 16, 1923, vol. 1, p. 1210, in Jour. Am. Med. Assn., Aug. 11, 1923, vol. 81, p. 508.*

The outstanding features which were common to the two cases recorded by Thomas were: absence of cyanide odor before opening the body, and absence of this smell from the urine; gaseous distention of peritoneal cavity and of intestines; smell of cyanide in all serous cavities; concentration of smell of cyanide in the lateral ventricles; intensity and precise color of facial lividity; blue nails; pink color of intestines and gastric mucosa; bright pink staining of intima of the aorta; uniform blue-green color of the liver; green color of gray matter of the brain; color and chemosis of the conjunctivae; lividity and engorgement of buccal, pharyngeal, esophageal and respiratory mucous membranes; extravasation of blood into the tissues of the stomach wall posteriorly in the region of the fundus; flabbiness of the myocardium; absence of putrefactive changes, of putrefactive odor, and of the ordinary postmortem staining; and positive chemical and spectroscopic tests. —K. R. D.

CHRONIC CARBON MONOXID POISONING. *A. Egdahl. Jour. Am. Med. Assn., July 28, 1923, vol. 81, pp. 282-284.*

"1. As the chances for exposure to carbon monoxid are so great, it would be well for the physician to keep in mind the possibility of

chronic poisoning when a patient presents himself with ill defined symptoms which cannot be explained otherwise.

"2. Repeated exposures to carbon monoxid, but not in sufficient degree to cause acute poisoning, will cause symptoms similar to the results of fatigue, and can be explained by lowered amount of oxygen in the blood.

"3. Just as a state of continued fatigue, so will a state of chronic carbon monoxid poisoning lower the resistance to various infections, or favor renewed activity of an old process.

"4. When there is a possibility of exposure to carbon monoxid, it would be well to make a blood test. By the use of various simple laboratory tests, it is possible to diagnose an early, or a presymptomatic stage of chronic poisoning and ward off the possibility of serious results.

"5. Preventive medicine has here a new field. Carbon monoxid poisoning is no longer confined to certain industries: the chances for poisoning are universal."—K. R. D.

THE ELIMINATION OF CARBON MONOXIDE FROM BLOOD, BY TREATMENT WITH AIR, WITH OXYGEN, AND WITH A MIXTURE OF CARBON DIOXIDE AND OXYGEN. *R. R. Sayers and W. P. Yant. U. S. Pub. Health Rep., 1923, vol. 38, pp. 2053-2074.*

"1. Recovery from carbon-monoxide poisoning depends to a great extent upon early elimination of carbon monoxide from the blood.

"2. The rate of elimination of carbon monoxide from the blood depends upon the percentage of oxygen in the air breathed, also upon the rate and depth of respiration.

"3. Pure oxygen causes the elimination of carbon monoxide about four times as fast as normal air, when breathed by persons who have been gassed until 35 or 40 per cent. of the hemoglobin in their blood has been combined with carbon monoxide.

"4. Breathing a mixture of oxygen containing 8 to 10 per cent. of carbon dioxide causes deep and rapid respiration.

"5. Breathing a mixture of oxygen and carbon dioxide (8 to 10 per cent.) causes the elimination of carbon monoxide about five to six times as fast as normal air, when breathed by persons who have been gassed until 30 to 40 per cent. of their blood has been combined with carbon monoxide.

"6. It is recommended that all victims not under a physician's care be caused to breathe oxygen in the purest form available for at least 20 to 45 minutes.

"7. It is recommended that physicians use the carbon dioxide-oxygen mixture where possible, and note the results, but when this mixture is not available that they use pure oxygen."—B. C.

HEALTH HAZARD FROM AUTOMOBILE EXHAUST GAS IN CITY STREETS, GARAGES, AND REPAIR SHOPS: THE VERTICAL EXHAUST AS A PRACTICAL MEASURE OF AMELIORATION. *Y. Henderson and H. W. Haggard. Jour. Am. Med. Assn., Aug. 4, 1923, vol. 81, pp. 385-391.*

"The air in city streets where there is considerable traffic is found to be contaminated with automobile exhaust gas to a degree in excess of proper and well established health standards. The amount of visible smoke is not an index of carbon monoxid content.

"The conditions in garages and repair shops are, as a rule, extremely unhealthful. Many mechanics and drivers suffer almost daily partial asphyxiation with headache and other sequelae. Fatal asphyxiations in private garages are fairly common occurrences in the winter.

"The conditions in the streets of American cities can be largely ameliorated by the use of the vertical exhaust on omnibuses, trucks, taxicabs, and private cars with tops. Cars without tops are now negligible in numbers in cities.

"The horizontal exhaust now generally used mixes the gas throughout the respiratory zone of street air in a layer only about 10 feet deep. It thus dissipates the heat of the gas and prevents it from rising out of the street. The vertical exhaust, on the contrary, starts the hot gas upward with comparatively little admixture of air, and its heat carries it on up out of the street.

"With the horizontal exhaust the entire air of the garage is rapidly mixed with exhaust gas. Adequate ventilation of garages is at present virtually not feasible. With the vertical exhaust, the heat of the gas holds it against the ceiling with comparatively little admixture of air, and the gas therefore readily finds its way out through any ventilator in the roof."—K. R. D.

SIGNS OF INCIPIENT LEAD POISONING. *A. Feil and R. Heim de Balsac. Abstr. as follows from Paris méd., May 26, 1923, vol. 13, p. 463, in Jour. Am. Med. Assn., Oct. 6, 1923, vol. 81, p. 1242.*

Feil and de Balsac examined 179 persons working with lead but not presenting symptoms suggesting injury from the lead. The lead line on the gums was found in 65 per cent., parotitis only in 3 per cent. Lead colic was the first symptom in 5 or 6 per cent. None of the other clinical signs or symptoms were specific or early. "The only reliance is on finding lead in the urine and basophil granulations in the erythrocytes."—K. R. D.

UNUSUAL CASE OF LEAD POISONING. *J. L. Maxwell. Abstr. as follows from China Med. Jour., July, 1923, vol. 37, p. 584, in Jour. Am. Med. Assn., Sept. 22, 1923, vol. 81, p. 1051.*

Maxwell records a case of lead poisoning in a woman whose work was to melt down counterfeit dollars which were mainly composed of lead, in order to recover from them such silver as they contained. This, apparently, was the only source from which the infection could have been derived.—K. R. D.

THE PATHOLOGY OF MOTOR PARALYSIS BY LEAD. *G. H. Hyslop and W. M. Kraus. Arch. Neurol. and Psychiat., Oct., 1923, vol. 10, pp. 444-445.*

These authors review the literature dealing with the pathology of lead paralysis. They point out that lesions have been found in every part of the neurone, from the cord to the muscles. The term peripheral neuritis is, therefore, considered erroneous and toxic neuronitis is suggested.—P. R.

THE QUESTION OF MEDICAL SUPERVISION OF STEREOTYPISTS, TYPEFOUNDERS, AND TYPEFOUNDERS' HELPERS. *L. Schwarz. München. med. Wchnschr., July 6, 1923, vol. 70, pp. 868-869.*

A study by means of the latest methods was made of the blood and urine of the workers in various printing trades. Among thirty-three stereotypists, some of whom had been employed for ten years, no symptoms whatever of lead poisoning were noted. Two out of fifty-one typefounders showed faint lead lines and three showed more than 100 stippled cells per million. Eight showed increased hematoporphyrin as the only symptom of plumbism. Thirteen typefounders' apprentices showed no typical symptoms of lead poisoning except hematoporphyrin, but seemed somewhat dull and heavy. This observation is in accord with the report by Schrumpf and Zabel of nervous disorders, dulness, and sluggishness among apprentices. One lead smelter engaged in melting and reclaiming scrap lead showed a distinct lead line, 350 stippled red cells per million, and greatly increased hematoporphyrin. He was already under medical care.

Among thirty-seven female typefounders' assistants two cases of unmistakable blood changes and seven cases of increased hematoporphyrin were found. No lead lines were noted probably because of better mouth hygiene among women than among men of the same age.

The author concludes: (1) that the printing trades incur a very slight lead hazard, and (2) that since ordinary medical examination would have overlooked the slight symptoms detected in these studies except in the one case of the smelter, and since more marked cases automatically come to medical attention, the extra cost of regular medical supervision of workers in these trades is unnecessary.—A. S. M.

TAR-TREATED ANIMALS. *V. E. Mertens. Abstr. as follows from Ztschr. f. Krebsforsch., July 13, 1923, vol. 20, p. 217, in Jour. Am. Med. Assn., Sept. 22, 1923, vol. 81, p. 1060.*

Mertens refound in internal organs the tar painted on the rabbits' ears. The severest injury was evident in liver and kidneys. Among his 257 tar-treated animals only one developed actual cancer.—K. R. D.

CASE OF CHRONIC MERCURIAL POISONING. *E. A. Carmichael. Proc. Roy. Soc. Med., Sept., 1923, vol. 16, Section of Neurology, p. 80.*

"Patient, a male, A. S., aged 51, thermometer maker.

"History: Eighteen months ago teeth became black and loose. Twelve months ago gums were painful. Three months ago salivation and unsteadiness of hands with 'trembling' of legs. Two months ago difficulty in going upstairs, followed later by weakness in wrists. Seven weeks ago bad occipital head-

aches and aching in knees and wrist. Looseness of bowels of indefinite duration. During the last three months memory very bad and speech slurred. No history of stabbing pains, vomiting, delusions or obnoxious taste.

"On admission: Skin of body and especially face dirty sallow colour. Teeth few in number, black, loose with retracted gums. Tongue raw looking. Arteries slightly thickened. Fundi normal. Pupils equal, no ocular signs. Lower jaw trembling as if silently mumbling. Hands and legs showed irregular tremor. Grasp poor, extensors of wrist weak. Plantar flexion of both ankles weak. Reflexes normal. Diminution of appreciation of pinprick and cotton wool of glove distribution on arms and also over legs and lower trunk. Blood count and picture normal. Gastric contents showed diminution of free HCl. Cerebro-spinal fluid and blood normal.

"The patient has improved considerably since admission."—M. C. S.

COPPER AS A CONSTITUENT OF MOTHER'S AND COW'S MILK: ITS ABSORPTION AND EXCRETION BY THE INFANT. *A. F. Hess and G. C. Supplee. Proc. Am. Soc. Clin. Investigation, April 30, 1923, reported in Jour. Am. Med. Assn., June 9, 1923, vol. 80, p. 1728.*

The milk of the cow, as well as mother's milk, regularly contains copper. The amount varies somewhat according to the dietary. The copper is absorbed by the infant and partly excreted in the urine. When the dietary includes cereal, larger amounts of copper are excreted.—K. R. D.

DUST HAZARDS AND THEIR EFFECTS

DUST-REMOVING APPARATUS. *F. Hoyer. Abstr. as follows from Ztschr. f. angew. Chem., 1923, vol. 35, pp. 677-679, in Chem. Abstr., June 20, 1923, vol. 17, p. 2066.*

A general description of the operation of cyclone separators, and cloth filter chambers working under vacuum and pressure, for removing dust from the air in factories.—P. D.

EXPLOSION OF SUGAR DUST, ITS CAUSES AND PREVENTION. *P. Beyersdorfer. Abstr. as follows from Ztschr. Ver. deut. Zuckerind., 1922, vol. 72, pp. 475-533; Internat. Sugar Jour., vol. 24, pp. 573-577, in Chem. Abstr., June 20, 1923, vol. 17, p. 2192.*

In the last three decades there have been sixty-two dust explosions in German sugar refineries. With one exception these explosions occurred as the factories were starting. The literature of sugar-dust explosions is reviewed. Beyersdorfer finds the ignition temperature of sugar dust to be 410° in air and 371° in oxygen. The minimum concentration of dust required to form an explosive mixture is 17.5 gm. and the maximum 13.5 kg. per cubic meter. The temperature of ignition depends upon the oxygen content of the air, and the heat of conductivity of any inert gas present. Carbon dioxide is especially depressing, even more than nitrogen, upon the explosion of the dust. Thermal sugar-dust explosions occur in two phases, the first being the gasifying of the dust and the second the oxidation of the gases formed. The electrical nature of sugar-dust explosions is shown, and means are given for its prevention, the most practical of which is the use of carbon dioxide in the crushing machines.—P. D.

REPORT ON THE GRINDING OF METALS AND CLEANING OF CASTINGS WITH SPECIAL REFERENCE TO THE EFFECTS OF DUST INHALATION UPON THE WORKERS. *E. L. Macklin and E. L. Middleton. H. M. Stationery Office, 1923, pp. 100.*

INVESTIGATION INTO THE DUST-CONTENT OF THE ATMOSPHERE OF WORK-PLACES IN THE GRINDING OF METALS AND CLEANING OF CASTINGS. *E. L. Middleton. Ann. Rep. Chief Inspector of Factories for the Year 1922. H. M. Stationery Office, 1923. Cmd. 1920. Pp. 92-105.*

The inquiry undertaken by Dr. Middleton falls into two parts, one having reference to clinical findings and the other to dust determinations. The main report which contains the medical and physical observations is a particularly useful and well-illustrated document; in it are described the various processes and appliances employed in grinding metals, and the composition of the wheels used is stated. The old-time grinding wheels are composed of sandstone with a silica

content of 70 to 95 per cent.; while manufactured wheels, which fortunately are coming into universal use, are made of corundum and other oxides of aluminium, and of carborundum which is carbide of silicon. In addition to this change in the composition of grinding wheels, the substitution of mechanical methods for hand grinding is also chronicled. When further advanced, these two alterations in method should go far toward eliminating the dust risk and with it "grinders' rot" from the metal industry.

Apart from this special risk the conditions of work in the past have been far from satisfactory. Poor conditions still exist in the tenement factories of Sheffield; here great grindstones run in dark ground-floor rooms, littering the ceiling, walls, and floor with wet swarf thrown off from the wet wheel as it is abraded by the tools being sharpened, while the gloom is only accentuated by the flare of a fish-tail gas burner. Risk of infection arises from the habit of spitting into the water trough in which the wheel turns and from which the spray is dispersed into the air. Outside Sheffield, however, the industry is, for the most part, carried on in large airy workplaces; but still the dust risk claims its victims.

Dr. Middleton subjected to careful medical examination 1,153 workers employed in various branches of the trade—the grinders on wet and dry sandstone wheels, and on manufactured wheels, cutters, hafters, glazers, and cleaners of castings—all having a dust risk but varied in kind. The physique of men at the more arduous processes, such as scythe grinding, was found better than that of men at lighter work; but these men were at least as much affected as the others. Chest expansion, taken as an indication of respiratory efficieney, was found diminished by industrial causes out of proportion to advancing age, and most so where the dust contained silica. Fibrosis, slight, moderate, and advanced, was detected; but as advanced fibrosis incapacitates, many men so affected could not be present at work. The condition insofar as it resulted from silicosis was the same as has been described by other observers; but in glazers and dressers a somewhat different type was found—areas of diminished air-entry associated with harsh breath-sounds in other areas, and, in addition, a change toward bronchial breath-sounds at the root area posteriorly, occurring bilaterally and equally on the two sides. Glazers and dressers are far less prone to develop tuberculosis than are sandstone grinders. Definite signs of tuberculosis were detected in 4.7 per cent. of those examined, and suspicious signs in 9.3 per cent.; some pulmonary complication was usually present, and ordinary phthisis was rarely seen. Bronchial catarrh, a form of bronchitis confined to the larger bronchi, was found in 19 per cent. It was related to the amount, rather than to the kind of dust risk; hence it was prevalent among dressers and glazers, while silica-stone workers were least affected. Chronic bronchitis usually was associated with fibrosis and was rather more prevalent with exposure to silica dust. Pulmonary catarrh, characterized by cough and "tightness of the chest," was symptomatic of advancing fibrosis, especially in those of stout build; it would appear to have a bad prognosis.

Alternation of work, from grinding to glazing with exposure to different dusts, appeared to be better than continued exposure to the same dust. The association of carbonaceous material, such as that from coke in moulding sand, with silica particles seemed to modify the injurious influence of the silica.

Generally speaking all the dusts met with in this inquiry seemed to possess irritating properties and to be capable of originating bronchial catarrh and bronchitis, followed by more or less fibrosis round the chronically inflamed air passages; while silica dust possessed a peculiar propensity to cause fibrosis of the alveolar areas and to be a predisposing cause of tuberculosis. Mortality from tuberculosis among this group of workers was found in Sheffield to have its age of maximum incidence at about 50 years as compared with about 40 for other males.

The results of 123 examinations of dust records taken with Owens' dust-counter are given. They show variations from 496 particles in 1 c.c. of air at wet sandstone grinding to 26,377 particles at strap glazing; while the percentage of particles over 2 microns in size varied from 0.7 to 34. The method of taking the records and of counting the particles is clearly described. The visual appearance of the air was found to be no criterion

of the presence of injurious dust or of the degree of injuriousness. The latter depended upon the concentration of fine particles of silica dust in a unit volume of air. The most injurious dust is so fine that it floats in the air and is diffused through a workplace. Dust from cleaning castings differs from that of grinding both in kind and in size; it contains less silica and is larger.

A code of regulations to apply to the processes concerned is put forward, in which the requirements are as follows: segregation of wet sandstone grinding; a copious supply of clean water for use in racing grindstones; the wearing of respirators; efficient general ventilation of workplaces; and localized exhaust ventilation to remove dust in dry processes. Special relaxations are permitted where the far less injurious manufactured wheels are used. This code, when enforced, based as it is upon knowledge acquired through scientific research, should prove a valuable addition to preventive medicine legislation.—E. L. C.

STUDIES ON THE RELATION OF MINERAL DUSTS TO TUBERCULOSIS. III. THE RELATIVELY EARLY LESIONS IN EXPERIMENTAL PNEUMOKONIOSIS PRODUCED BY CARBORUNDUM INHALATION AND THEIR INFLUENCE ON PULMONARY TUBERCULOSIS. *L. U. Gardner. Am. Rev. Tubere., July, 1923, vol. 7, pp. 344-357.*

Due to the proven ability of SiO_2 to produce silicosis, carborundum, SiC, was chosen as a non-silicious compound in which silicon is combined in a different manner. The carborundum used consisted of a fine dust with the individual particles varying from 48 to 0.3 microns in diameter while particles suspended in air were, for the most part, 1.5 microns or less.

Guinea-pigs were infected with tubercle bacilli of low virulence and, together with normal guinea-pigs as checks, were exposed to carborundum dust of an average concentration of 4.88 mg. per cubic foot of air over a period of seven months, the total exposure amounting to 1,599 dust hours.

The animals, both normal and infected, were killed in pairs or groups of four at monthly intervals over a period of sixteen months from the beginning of the dusting. Paraffin lung sections of the normal animals showed dust in most of the alveoli, "occasionally as free particles, but usually contained in phagocytes." No evidences of fibrosis were found.

In the case of the infected animals it was concluded that the carborundum dust in no way affected the virulence of the bacillus and that a secondary invasion of the lungs noted in the infected animals was due to mechanical effects.

The author concludes that the generally negative character of the results supports the chemical theory advanced by English observers, namely, that silicosis is produced by a crystalline form of silica having distinctive chemical properties. He does not consider the results which obtained to be conclusive with regard to carborundum, since the animals were exposed for relatively short periods.—P. D.

DUST REMOVAL EQUIPMENT. *Nation's Health, June, 1923, vol. 5, p. 384.*

A brief account of the dust removal equipment used in the polishing and grinding departments of the South Bend works of the Studebaker Corporation.—K. R. D.

PRACTICAL METHODS FOR REMOVAL OF DUST AND FUMES. *H. H. Valiquet. Nation's Health, Aug., 1923, vol. 5, pp. 519, 574.*

Valiquet outlines briefly a number of practical facts to be considered in installing systems for the removal of various kinds of dust and fume.—K. R. D.

THE DETERMINATION OF DUST LOSSES IN METALLURGICAL PROCESSES, AS PRACTICED AT THE PORT PIRIE WORKS OF THE BROKEN HILL ASSOCIATED SMELTERS PROPRIETARY, LTD. *A. J. Hemingway. Abstr. as follows from Proc. Australasian Inst. Mining Met., 1922, No. 47, pp. 237-244, in Chem. Abstr., Aug. 10, 1923, vol. 17, p. 2550.*

A description of standard methods, aspirating small amounts of gases and using filter-thimbles.—P. D.

UPPER RESPIRATORY TRACT IN GRANITE DUST INHALATION. *D. C. Jarvis. Abstr. as follows from Ann. Otol., Rhinol. and Laryngol., June, 1923, vol. 32, p. 405, in Jour. Am. Med. Assn., Sept. 8, 1923, vol. 81, p. 855.*

The effects of granite dust inhalation on the respiratory tract were made the subject

of study by Jarvis. A study of the industry revealed men who had inhaled granite dust with impunity over periods ranging from thirty to fifty-nine years, and other men who suffered severely even when exposed for less than fifteen years. It was found after twelve years of observation that the upper respiratory tract held the key to the situation, and that an individual was a good risk in proportion to the absence of lymphoid tissue in this region. As a result of granite dust inhalation there occurs an adaptation to occupation of the upper respiratory tract. Absence from occupation causes a loss of this adaptation and a re-entry into the industry produces irritation of the respiratory tract while the man is endeavoring to regain his lost adaptation. This last effort brings about a suitable preparation of the soil. Mouth breathing is not as injurious as nasal respiration in granite dust inhalation. Jarvis suggests that an inquiry as to the occupational history may assist in deciding the method of anesthesia when contemplating work on the respiratory tract.—C. K. D.

Miners' Silicosis: Its Pathology, Symptomatology and Prevention. *R. T. Legge. Jour. Am. Med. Assn., Sept. 8, 1923, vol. 81, pp. 809-810.*

Legge reviews the experimental work of Haldane, Mavrogordato, Fenn, Gye and Kettle, etc., upon the development of pulmonary fibrosis following the inhalation of silicon dust, and contrasts this condition with the less serious anthracosis of coal miners. He divides the clinical course of silicosis into three stages and discusses the characteristic symptoms and physical findings for each stage.

Preventive measures consist in mechanical exhaust ventilation and the wet process of mining, medical supervision and education of workers, and general improvement of the living conditions of miners. The only treatment for the affected worker is to change his work to a less laborious outdoor job free from dust, with a view to preserving what normal lung tissue is left.—K. R. D.

Occupational Sensitization to Castor Bean. *H. S. Bernton. Abstr. as follows from Am. Jour. Med. Sciences, Feb., 1923, vol. 165, p. 196, in Jour. Am. Med. Assn., April 7, 1923, vol. 80, p. 1027.*

Bernton narrates the case of a chemist who in the course of his occupation acquired a sensitiveness to the dust of the castor bean. Attacks of sneezing and of asthma were the clinical manifestations of this sensitiveness. The fat-free castor meal produced an urticarial wheal at the site of a superficial scratch on the forearm. A cutaneous reaction was obtained with a drop of the protein solution of the meal in a dilution of 1:250,000. Symptoms of protein intoxication resulted from the absorption of extracts of the castor meal from skin abrasions. The presumptive evidence indicates that the globulin fraction possesses antigenic properties, and that exposure to organic dust in industries may cause an acquired sensitiveness. Cutaneous testing with the suspected material would be of value in diagnosis and treatment.—K. R. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

A Survey of Occupational Anthrax in Germany. *Internat. Labour Rev., Aug., 1923, vol. 8, pp. 269-278.*

This article gives a bird's-eye view of the anthrax problem in Germany where, although no comparison is instituted, it presents a sharp contrast to the problem in Great Britain. Anthrax in Germany is endemic among domestic animals, and cases in human beings show a close relation to the notified cases in animals; thus in 1912 and 1913 there were 6,283 and 6,816 cases in animals and 287 and 288 in human beings, and in 1920 and 1921 there were 841 and 1,315 cases in animals and 35 and 80 cases in human beings. The problem then is one originating, at any rate partially, at home; in Great Britain anthrax among animals is unusual and the cases bear no such relation to cases among human beings. The position is seen by comparing the cases according to the occupations of those affected:

Occupations	*Germany* Cases 1910-1921	*Great Britain* Cases 1912-1921
Hides and skins	538	164
Hair and bristles	113	Horsehair 46
Wool	4	385
Other	57	29

In Great Britain the problem is concerned with imported wool, hides, and hair, and originates in the countries whence these articles come. In Germany 88 per cent. of the cases in the hide and skin industry occurred from handling raw hides and skins before soaking; in Great Britain most cases in this industry originate in handling imported hides and skins. Nevertheless the article states that even in Germany the great majority of cases were traced to skins of foreign origin. The most pronounced contrast occurs in cases arising from wool. Agriculture was responsible for 746 human cases in the eleven years 1910 to 1921 in Germany, or 68 per annum, or about 200 every three years; in the three years 1910 to 1912 in England and Wales there were 5 cases among farmers and agricultural laborers, and anthrax in animals has in several cases been definitely traced to infection from imported materials. In 18 out of 54 cases of internal anthrax the seat of infection was the respiratory organs; in 19 cases the digestive organs. In 482 of the 865 cases of external anthrax the seat of infection was the upper limbs, in 256 the head, and in 75 the neck. In the hide and leather industry 52 per cent. of the cases arose from sheep and goat skins, and 48 per cent. from cow hides. Agricultural anthrax in Germany is rapidly decreasing with decrease in importation of material from abroad; in 1915 there were 120 cases reported, whereas in 1919 there were only 5, and in 1920 there were 10 —an indication that there is now less resultant infection of meadows through waste waters from tanning and other works. Similarly a reduction is to be noted in industrial anthrax; in the hide and skin industry in 1910 and 1911 there were 110 and 89 cases, and in 1920 and 1921 there were 8 and 22 cases; in the hair and bristle industry in 1910 and 1911 there were 15 and 19, and in 1920 and 1921 there were 6 and 7.—E. L. C.

ANTHRAX IN THE TANNERY INDUSTRY. *H. Leymann. Internat. Labour Offices, Studies and Rep., Series F, No. 7, Aug., 1923, pp. 30.*

This study deals with anthrax in the German tannery industry which accounts in that country for a far larger number of cases than any occupation except agriculture. In the period 1910 to 1921 the numbers were 538 ascribed to hides or skins, 113 to hair and bristles, and 4 to wool. The total cases among tanyard workers fell from 288 in 1911 to 18 in 1919, but rose to 80 in 1921. Dr. H. Leymann ascribes the decrease to cessation or great restriction of import of foreign hides and skins during the war, and gives a table showing that out of 335 cases in which the origin was traced, only 19 were due to native skins and hides. The problem of prevention is then one of disinfecting foreign material. Three methods of disinfection which have been introduced are described. Some doubt is expressed concerning the efficiency of the Seymour-Jones process which consists of dipping the hides into a solution of 0.02 per cent. chloride of mercury and 0.9 per cent. formic acid; but accurate information as to how the method is applied was not at Dr. Leymann's disposal. The pickling process, originally worked out in Vienna by Schattenfroh and by Gegenbauer and Reichel, consists in using a solution of 1 to 2 per cent. hydrochloric acid with 10 per cent. common salt at a temperature of 20° to 40°C. It is a separate process and has the advantage that hides so treated can thereafter be stocked. The third method was developed by the Federal Office of Health; it is a lye process in which the hides are treated with a 0.5 per cent. soda lye with 1 to 10 per cent. common salt. It has the advantage of being able to be combined with liming or possibly with salting, but the disadvantage that the hides cannot be stocked after treatment.

Before deciding whether the pickling or the lye method should be adopted, the question must be answered whether the imported material is to be disinfected at centralized stations before distribution to the factories, or at the tanyards themselves. One method is suitable for one answer, the other for the other. Central disinfection has economic disadvantages and would hinder commerce, but it would insure more efficient disinfection. Dr. Leymann himself rather favors disinfection at the tanyards. This report is a useful contribution to arriving at a decision.—E. L. C.

TRAUMATISM INFLUENCING SITE OF SYPHILIDS. *Halbron and Barthélmy. Abstr. as follows from Annales des Maladies Vénériennes, July, 1923, vol. 18, p. 526, in Jour. Am. Med. Assn., Sept. 22, 1923, vol. 81, p. 1053.*

In the first of the two cases described, the lesion in the right palm had proved refractory for a year under treatment with the usual local measures. The man was a shoemaker, and his tools fitted into the palm affected. The positive Wassermann reaction pointed the way to effectual treatment, as in the second case in which the lesions were between the right scapula and the spine. They had been mistaken for lupus, but subsided under specific treatment. The region showed the traces of cautery for neuralgia four years before.—K. R. D.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

ETIOLOGY OF BAKERS' DERMATITIS. *O. De Jong. Abstr. as follows from Lancet, May 5, 1923, vol. 1, p. 894, in Jour. Am. Med. Assn., June 16, 1923, vol. 80, p. 1812.*

De Jong suggests that salt may justifiably be regarded as the direct cause of bakers' dermatitis, but the patient must display an idiosynerasy for the salt as the condition is not found in all bakers. It is interesting to note that dermatitis occurs in people other than bakers who are habitually engaged in the handling of salt—for example, herring salters and packers, and rock salt workers. A man suffering can be cured under simple treatment on being removed from his work if there are no secondary symptoms, but on his return to work he will relapse.—K. R. D.

DERMATITIS FROM OLEIC ACID: REPORT OF A CASE. *W. H. Hailey. Arch. Dermat. and Syph., Oct., 1923, vol. 8, p. 530.*

"The following case is of interest in that the sufferer pursues a common occupation.

"*History.*—Miss N. M., a stenographer, aged 20, complained of rough finger tips of eight months' duration, which cracked open causing great inconvenience and pain. She had been receiving violet ray treatment three times a week, without improvement. The remainder of the history had no connection with the present condition.

"*Examination.*—There was an erythematous scaly dermatitis, with an occasional fissure, which was confined to the palmar surface of the distal phalanges of all the fingers and both thumbs. She had no other skin condition, except a small amount of acne, which was worse during menstruation.

"Questioning revealed that the dermatitis developed after she began stenographic work. She said that in her work she used a milk colored liquid called 'Dermax.' This was painted over the stencil sheet, she then picked up the sheet and placed it in the typewriter. A companion who did the same work suffered from the same trouble.

"According to the manufacturers, 'Dermax' is composed of diluted turkey red oil and glycerin. From Dr. Carl Green, a chemist, I learned that turkey red oil is oleic acid, a by-product in the manufacture of soap. He stated that oleic acid is an irritant and could cause a dermatitis.

"*Treatment.*—The patient was advised to use rubber finger cots while doing stencil work. She was given a mild salicylic acid ointment to hasten peeling and to heal the fissures. Recovery was immediate."

PREVENTING INFECTIONS FROM CUTTING OILS AND COMPOUNDS. *A. C. Hall. Nat. Safety News, Aug., 1923, vol. 8, pp. 33-34.*

The prevention of infections from cutting oils and compounds is a serious problem for every industrial surgeon. Types of skin infections usually encountered are:

1. Dermatitis or "oil rash."
2. Folliculitis, that is, multitudes of small infected hair follicles.
3. Furunculosis, or several deeply seated, circumscribed infected areas (boils).
4. Virulent streptococcic infections following slight abrasions.

Dermatitis occurs either because the compound is too irritating or because the individual is susceptible to the compound. Folliculitis and furunculosis are bacterial in origin and are caused by infected oils and compounds, by infection from fellow workmen, or by the bacteria of the workman's own body entering a skin, the resistance of which has been lowered by irritation. The

fourth class of infection results from infection of a slight cut or wound by a virulent organism. The following precautions will eliminate the greater part of cutting oil troubles.

1. Use oils which are non-irritating and free from bacteria, if possible.
2. Give careful attention to the selection of men, and avoid placing persons susceptible to infection in departments where oil is handled.
3. Make systematic bacteriological check-ups to determine the condition of the oils.
4. Pay special attention to the manner in which the men wash.
5. Filter and sterilize oils that are used repeatedly.
6. Remove all infected men from oil and from fellow workers.
7. See that all minor injuries, irritations, and infections of every type are reported at once to the plant hospital or to the plant physician for treatment.

Reference is made to Safe Practices Pamphlet 44 on Prevention of Skin Troubles from Cutting Oils and Emulsions, published by the National Safety Council. This contains more detailed information on the subject.—G. N. T.

OXFORD OPHTHALMOLOGICAL CONGRESS, 1923.

The morning session of July 7 of the Congress was devoted to the "Diagnosis of Coal Miners' Nystagmus with Special Reference to the Workmen's Compensation Act." While the opinion of the majority of the Congress was in favor of making the presence of oscillation of the eyes essential to the diagnosis of the disease, this opinion was not unanimous. The second question in dispute was regarding the advisability of sending a man back to underground work after recovery from an attack of the disease. Most of the speakers were in favor of such a return and thought that it was for the best interest of the workman.

In opening the discussion Mr. R. J. Coulter said that the great difficulty was to discover whether a man was free from the disease. Oscillation was the important symptom but if blepharospasm or giddiness were present it would be difficult to advise the man to work underground. He placed reliance on deficient light sense.

Dr. Haldane spoke of the similarity between miners' nystagmus and gas poisoning, and laid stress on the necessity of work in bringing about a cure. In gas poisoning graduated exercises brought about recovery and it was important to get the nystagmic patient back to work before he became depressed and neurasthenic.

Mr. G. H. Pooley of Sheffield spoke of his investigations in Belgium, where persistent oscillation only was taken as a standard of incapacity and where the men returned to underground work after a short rest. Oscillation of the eyes was the only symptom on which a definite diagnosis could be made. This sign is best brought out by ophthalmoscopic examination after suitable exercises in a dark room. Head tremor was not always present and could be simulated. Incapacity was due to a superimposed neurosis, the result of idleness. If surface work were provided, return to pit work would soon be possible. He deprecated as bad medical work the advice of those medical men who told their patients never to go underground again. He advocated introduction of the Continental standard.

Mr. H. S. Elworthy of Ebbe Vale spoke of the tendency to attach too much importance to the amount of oscillation present. Some men with violent oscillation could work well while others with slight movements were incapacitated.

Dr. Llewellyn of Nottingham gave his own routine method of examination, laying stress on the history and general appearance of the patient, the presence of oscillation of the eyes, and the head test. He was never satisfied unless he detected oscillation. He said that differential diagnosis from arteriosclerosis was sometimes difficult. Many old colliers with greatly increased blood pressure attributed the symptoms of headache and giddiness on stooping, which are common to both diseases, to the onset of miners' nystagmus. The nystagmic patient should be given work, and should in most cases return to underground employment. The first duty of the medical man was to do no harm; those medical men who told their patients that they were never to return to their old work after an attack were almost passing a sentence of industrial death upon the miner and were helping to bring about a state of depression

and neurasthenia.

Every effort should be made to encourage the patient and to allow him to return to the occupation for which he is most fitted. Oscillation in itself was not a cause of incapacity; he had seen many men at work underground with most pronounced movement.

Mr. Harrison Butler, Coventry, thought that the condition was a specialized neurosis not resembling any other kind of neurosis. The question as to whether the neurosis or the oscillation was the first cause had still to be decided. In his opinion the neurosis was the important feature and the cause of the incapacity. It was due to absorption of some toxic agent and not to deficient light or to the position assumed at work. The chief symptom was giddiness, a symptom not found in other neuroses. He called for expert statistical information on the recurrences which followed return to underground work. His present opinion was that men should not return to their old employment.

Dr. Van der Hoewe asked if the number of cases had increased after the introduction of the compensation act. He thought simulation of the disease difficult but drew the attention of the Congress to the fact that it was possible to obtain oscillation in one eye if the other were closed.

Mr. Bernard Cridland, Wolverhampton, held that the whole clinical picture, which was in most cases unmistakable, should be taken into account in making a diagnosis of the disease. Men should not be driven underground after an attack of the disease. The chief symptom and the last to disappear was vertigo.

Dr. Barrie thought that relapse was common and that return to work below was not advisable.

Dr. Paterson, Durham, said that most men do not want to leave the pit and there was no question of driving the men back to work. Giddiness was the chief disabling factor but he had often been surprised at the way this symptom had completely cleared up after wax had been removed from the ears.

Mr. Jamieson Evans, Birmingham, expressed the opinion that the neurosis present was the cause of the incapacity. The difficulty was to determine the physical signs which demonstrated the presence of a neurosis. He attached little importance to the presence of slight oscillation discovered after prolonged examination. He did not think the light deficiency test capable of clinical application. It could only be used in a laboratory. He advocated return to work and suggested that the medical men who advised the contrary were acting *contra* Coué.

Dr. Kaiger, Sheffield, answering Dr. Van der Hoewe, said that there had been a great increase in the number of cases since the introduction of the compensation act. Formerly the men went back to work readily. He had at one time thought that they should not return underground but he had been converted and felt that it was in the interests of the men themselves that they should be advised to go to their old employment.

SECOND REPORT OF THE MINERS' NYSTAGMUS COMMITTEE. *Med. Res. Council, Special Rep. Series No. 80, Aug., 1923.*

This report is mainly the work of Mr. Pooley and is divided into two sections, the first of which deals with the incapacity resulting from miners' nystagmus, and the second with the relative importance of errors of refraction in the etiology of the disease.

The incidence of the disease was formerly the same in Great Britain and on the Continent. In late years, owing to the influence of the Workmen's Compensation Act and to the enlargement of the definition of the disease, the number of men incapacitated is steadily increasing in Great Britain, while on the Continent, where the standard of incapacity is higher, no corresponding increase has been observed. In Great Britain the incidence has increased from 0.08 in 1909 to 0.42 in 1922, whereas in Germany the incidence has fallen from 0.3 in the period 1905 to 1913 to 0.03 in 1920.

Not only has the incidence increased but the period of incapacity has been prolonged. Here again a contrast is drawn between Belgium where almost all men return to work within six months and Great Britain where, in 1921, over 2,000 men had been off work for a period of two years or more. Clinically the cases in Great Britain and the Continent resemble each other, and the Committee states definitely that in its opinion the great increase in the number of cases in the former country is due to the ease with which

ertification can be obtained and to the continued payment of compensation without a periodic assessment of incapacity.

An estimate of the amount of incapacity present was made in all cases of persons in receipt of compensation in a large coal field, and the result is given in the following table:

	Present Condition	*Assessed Condition*
Not working	468	270
Working on surface	162	154
Working underground	20	226

"The result convinces us that machinery should exist for assessing periodically the incapacity present for which compensation is being paid and upon which the amount of compensation should be based."

An attempt is made to classify the severity of the attack in accordance with the physical signs present, and a recommendation is made that only those cases which show persistent oscillation of the eyes in the dark or after exercise should be considered to have nystagmus sufficiently severely to be certified for compensation. The summary and conclusions of the first section of the report are as follows:

Summary

A large proportion of underground miners exhibit signs which, *if complained of*, might establish a claim for compensation.

Consideration of the records for compensation claims in other countries as well as in this country, and of the factors which have been at work influencing these claims, leads to the conclusion that there is no sound evidence of increase in the clinical entity, miners' nystagmus.

The standard of incapacity in this country is governed by the nomenclature of the disease in the Schedule of the Workmen's Compensation Act. This standard differs from, and is decidedly less stringent than, that adopted on the Continent.

The nomenclature which determines the standard of incapacity has an important influence upon the duration of incapacity. Hence we find that the duration of incapacity is unreasonably extended in this country as compared with the Continent.

The standard of physical signs which is in vogue in this country for deciding whether any case should be certified as suffering from miners' nystagmus, too readily admits psychoneurotic patients to whom harm and not benefit accrues from compensation. A stricter standard based on physical signs should be adopted.

Impartial assessment of the amount of incapacity found in cases in receipt of compensation points to a need for periodic reassessment.

Conclusions

1. The official figures show an apparent increase in the disease.

2. The cases, however, fall into two groups: (1) severe cases of the type recognized as incapacitating in France and Belgium. This group has not increased in these countries in recent years and appears even to have diminished as the safety lamps have improved. (2) Cases in which the psychological element largely predominates owing to the wide interpretation placed upon the definition of the disease in the Schedule of the Workmen's Compensation Act. This group is the one which has increased the reported cases.

3. The decision as to whether any given case belongs to Group 1 or Group 2 is purely a medical question and should be left to medical men who have had special experience of the disease.

4. Most cases of miners' nystagmus are only partially incapacitated; they benefit physically and psychologically by work. Some require work above ground; others are fit for suitable work below ground. All men in this group should receive every encouragement to start work as soon as possible.

5. A few exceptional cases with short mining experience should never return to work below ground; these men should in their own interests be drafted out of the industry immediately.

The second section of the Report deals with the relative importance of errors of refraction, concerning which there has been much diversity of opinion. Mr. Pooley states definitely, as a result of an examination of a large number of miners, that the incidence of errors of refraction among miners suffering from miners' nystagmus is not greater than among

miners not so affected. Tables are given in support of this view.—T. L. L.

DISCUSSION FROM THE HYGIENIC STANDPOINT OF VISUAL EXAMINATION AND CONDITIONS AFFECTING VISUAL APTITUDE. *E. Ginestous. Ann. d'hyg., June, 1923, New Series, vol. 1, pp. 311-321.*

The author points out the inadequacy of and the lack of harmony between the eye examinations for railway employees of different French railway companies and suggests standard methods embracing: (1) central visual acuity, including (*a*) speed of acuity, and (*b*) acuity following variations in lighting; (2) color vision; (3) peripheral vision; and (4) binocular vision.

It is suggested that facilities already existing for the examination of aviators and railway men be used.—P. D.

AN ACCOUNT OF AN EXPERIMENT ON VISUAL AFTER-SENSATION IN REFERENCE TO ILLUMINATION IN COAL MINES CARRIED OUT BY THE NATIONAL INSTITUTE OF INDUSTRIAL PSYCHOLOGY. *E. Farmer. Brit. Jour. Ophth., July, 1923, vol. 7, pp. 328-329.*

Experiments were carried out to measure the effect, as shown by the number and duration of visual after-sensations, of the ordinary miners' lamp in various positions in relation to the eye of the subject, and with various methods of diffusing the source of light. The most significant result was the evidence in favor of translucent light. Thirty miners were tested for visual acuity with the standard and translucent light and, although the latter had an illumination 28 per cent. less than the standard, visual acuity with it was better in the case of fifteen miners, and as good in the case of nine more. The translucent type of lamp is easily manufactured by treating the outer glass of the standard lamp with hydrofluoric acid. One manager reports that "the men who have worked with the electric lamps fitted with opaque protecting glasses are very pleased with them, finding their work more comfortable, less strain on their eyes, and would not like to go back to the ordinary clear glasses again."—G. N. T.

EFFECT OF INCREASE OF INTENSITY OF ILLUMINATION ON ACUITY, AND INTENSITY OF ILLUMINATION OF TEST CHARTS. *C. E. Ferree and G. Rand. Am. Jour. Ophth., Aug., 1923, vol. 6, pp. 672-675.*

The purpose of this study was to determine the effect of increase in intensity of illumination on the acuity of the normal eye, and to compare this effect with that obtained when the same eye was made slightly defective as to refraction. Four observers were used in the series of experiments on the normal eye, and the acuity was determined starting at 0.001 foot-candle of light normal to the test object and working up by successive increases to 20 foot-candles. One of the four observers was also tested after his eyes had been made artificially astigmatic. The results obtained are given in three charts, one showing the effect of increase of intensity on acuity, acuity being plotted against foot-candles. The other two make comparisons between acuity of eye with normal refraction and the same eye made slightly astigmatic; in the first, acuity is plotted against foot-candles, and in the second, percentage gain in acuity against foot-candles.

The author believes that in the rating of eyes as to fitness for vocations the test should be made as nearly as possible at the illumination usually employed in the vocation in question. In all cases, it will be found that the sensitivity of the acuity test is very greatly enhanced when the procedure is made to include speed, power to sustain, and accuracy, instead of accuracy alone as is the case in the conventional method of testing acuity.—G. N. T.

THE VISION OF RAILWAY SERVANTS. *J. Barrett. Brit. Jour. Ophth., July, 1923, vol. 7, pp. 329-332.*

Tests were made with people of normal and supernormal vision to determine their ability to recognize signals in the open air. Factors affecting the distance at which the semaphore could be recognized are: (1) the background (very materially); (2) the atmosphere (very materially); and (3) the color of the semaphore (to some extent). It was concluded that such tests were inaccurate and that testing should be done indoors under standardized conditions.

The writer believes that the visual standards adopted in the Pilot Service of Victoria are quite satisfactory. Under these, men en-

tering the service must possess 6/6 vision in each eye, and must have a total error of refraction not exceeding one dioptre of which 0.5 dioptre may be astigmatic. They may not be excluded from the service so long as they possess vision of 6/12 fully in each eye, that is, practically 6/9 with the two together. —G. N. T.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

REACHING WORKMEN AS CITIZENS WITH THE SAFETY IDEA. *C. W. Price. Nation's Health, Sept., 1923, vol. 5, pp. 605-606.*

The author emphasizes the importance of an intensive educational effort along safety lines made through community safety campaigns as well as campaigns in individual plants. Community safety work helps to insure an employer against the loss of the services of his workmen because of death or serious injury outside the plant. Systematic daily instruction in public and parochial schools, a continuous poster campaign on the streets, and an intensive educational campaign in the newspapers are the most effective means of reaching all the people in a community and of inducing them to stop being careless and to begin being careful.—K. R. D.

RELATION OF SAFETY MUSEUM TO THE STATE INDUSTRIES. *J. Roach. Nation's Health, July, 1923, vol. 5, pp. 433, 434, 498.*

Roach reviews the methods by which the New Jersey Department of Labor secured the interest and co-operation of employers in the enforcement of its safety codes, and discusses the development and usefulness of the New Jersey Industrial Safety Museum.—K. R. D.

EVERYWHERE SAFETY PAYS FOR ITSELF IN INCREASED PRODUCTION. *J. A. Oartel. Nation's Health, July, 1923, vol. 5, pp. 440, 441, 502.*

Oartel discusses the essentials of a safety program from three points of view—the safeguarding of machinery, the application of safety principles to the handling of raw material as it passes through a plant, and, finally and most important, inculcating the safety idea in the minds of workmen. Interesting programs and practices not only aid in reducing accidents and in saving money for the employer; they also, as a result of the association of workmen, foremen, and superintendents in safety committee meetings, tend to promote cordial relations and co-operation among the factory personnel.—K. R. D.

SAFETY PRECAUTIONS IN THE USE OF MANUFACTURED ABRASIVE WHEELS. *Internat. Labour Rev., July, 1923, vol. 8, pp. 126-135.*

A summary of the protective measures adopted in different industrial states against the risk of bursting in the case of abrasive wheels is presented, and diagrams are given showing how wheels should be fixed on spindles, and how adjustable guards for intercepting flying fragments can be applied. The maximum peripheral speed recommended is practically the same in all states reporting—4,500 to 5,500 feet per minute in France, Germany, Great Britain, and United States; but this maximum has to be lowered for silicate wheels to 15 meters per second. Codes of regulations are either in force or being drafted in most of the countries controlling the use of manufactured abrasive wheels, the employment of which has been spreading rapidly for some years. These wheels are on the whole safer to use than the old sandstone wheels; they do their work better; and they abolish the main risk from dust, since they generate less of it and are not composed of free silica.—E. L. C.

SAFETY IN GAS WELDING AND CUTTING. *C. F. Worfolk. Nat. Safety News, July, 1923, vol. 8, p. 38.*

This is a brief article touching on the necessary precautions to be taken in a welding shop to prevent accidents from burns, fires, and explosions.—R. M. T.

SAFETY AND EFFICIENCY IN THE CHEMICAL INDUSTRY. *L. A. DeBlois. Nat. Safety News, July, 1923, vol. 8, pp. 31–32.*

The materials handled in a well-established and well-ordered chemical plant offer no greater hazard than is encountered in mechanical plants. Discipline, careful selection, and instruction of new employees in the

processes of manufacture, however, are of very great importance.—R. M. T.

SAFETY IN ELECTRIC WELDING AND CUTTING. *D. H. De Yoe. Nat. Safety News, July, 1923, vol. 8, p. 39.*

The use of the electric arc for cutting and welding is subject to certain safeguards for the protection of the operator and of men working in his vicinity. It is necessary to shield the apparatus in some way in order to prevent the burning effect from the arc. The operator should also be safeguarded from electric shock.—R. M. T.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

REST PAUSES. *G. H. Miles. Jour. Nat. Inst. Indust. Psychol., July, 1923, vol. 1, pp. 287-291.*

"This paper calls attention to the need for a more careful study of the effects of rest pauses according to the individuality of the worker and the character of the work on which he is engaged. The superiority of organized over spontaneous periods of rest and the difficulties in the introduction of such organized periods are explained."—K. R. D.

AN ANALYSIS OF THE EFFECTS OF SPEED ON THE MECHANICAL EFFICIENCY OF HUMAN MUSCULAR MOVEMENT. *H. Lupton. Jour. Physiol., 1923, vol. 57, pp. 337-349.*

The oxygen consumption resulting from definite exercise in mounting stairs at different speeds was measured. Mechanical efficiency of movement was found to vary with speed. An optimum speed was ascertained at which efficiency was maximum. This maximum efficiency had a value of about 24 per cent., and occurred when a single movement of the leg occupied about one and three-tenths seconds.

Another series of experiments showed that the energy required *to set up* a contraction capable of doing maximum work, W_0, is about 2.6 W_0. This is close to the value, 2.5 W_0, deduced by A. V. Hill from experiments on frogs, and gives a theoretical maximum efficiency of 38.5 per cent. The energy required to *maintain* the contraction, if it is actually to do work, is one factor in diminishing efficiency; the other factor is the irreversible frictional loss involved in actual contraction at a definite speed.—E. L. C.

ELECTROMYOGRAPHIC STUDIES OF MUSCULAR FATIGUE IN MAN. *S. Cobb and A. Forbes. Am. Jour. Physiol., July, 1923, vol. 65, pp. 234-251.*

"Electromyograms of rapidly fatigued muscles show a decrease in frequency of the action-currents, and an increase in amplitude of the individual action-currents.

"It may be argued on theoretical grounds that these observations are evidence that fatigue takes place at the neuro-muscular junction, although they might be explained by fatigue acting on the muscle fibers in a selective manner, raising the threshold of excitation more than it reduces the size of action-current."

FATIGUE AS A FACTOR IN THE CAUSE AND TREATMENT OF TUBERCULOUS DISEASE. *H. A. Pattison. Jour. Am. Med. Assn., Oct. 13, 1923, vol. 81, pp. 1252-1257.*

The author, after quoting extensively from the literature upon the relation between fatigue and disease, concludes that in the field of tuberculous research the following problems are worth while:

1. The determination whether or not the "toxic substances" of fatigue are the cause or one of the important causes of the activation of latent tubercle and the manner in which they act.

2. The development of satisfactory, easily applied tests or clinical guides for determining cumulative fatigue.

3. The further study of occupations for the tuberculous with reference to those features of employment producing mental and physical fatigue.—K. R. D.

HEAT, COLD AND HUMIDITY

DETERMINATION OF THE COMFORT ZONE WITH FURTHER VERIFICATION OF EFFECTIVE TEMPERATURES WITHIN THIS ZONE. *F. C. Houghten and C. P. Yagloglou. Jour. Am. Soc. Heating and Ventil. Eng., Sept., 1923, vol. 29, pp. 515-536.*

Defining effective temperature as ". . . an index of the degree of warmth which a person will experience for all combinations of temperature and humidity," the writers describe in detail experiments along the same general lines as those which they recently reported (see THIS JOURNAL, July, 1923, vol. 5, Abstract Section, p. 69). Using a large number of subjects, chosen at random and "representing as many different occupations as possible" the authors obtained a series of curves in which effective temperatures were plotted as abscissae and percentage of total votes as to the comfort conditions of the room as ordinates. As in their previous experiments two rooms were used, each kept under definite conditions of temperature and humidity. By having the subjects pass from one room to the other errors due to acclimatization were minimized. The frequency curves obtained indicate that "the majority of the comfort points lie between 63 and 66 degrees effective temperature." They suggest 61.8 and 68.8 as the lower and upper limits of the zone, and 64.5 as the comfort line, these three temperatures being on the effective temperature scale.—P. D.

WOMEN AND CHILDREN IN INDUSTRY

WOMEN IN KENTUCKY INDUSTRIES. A STUDY OF HOURS, WAGES, AND WORKING CONDITIONS. *U. S. Dept. Labor, Women's Bur. Bull. No. 29, 1923, pp. 114.*

This bulletin embodies a report of the investigations of women in Kentucky industries which extended through the months of October and November, 1921. The investigation was made at the request of the Governor of Kentucky and the Kentucky Federation of Women's Clubs, and covers a survey of hours, wages, and working conditions for women in industry throughout the state.

Although Kentucky is not a leading industrial state, its industries are an important feature. For this investigation a number of representative plants in the various industries employing women were chosen. Stores, laundries, telephone exchanges, and manufacturing establishments were visited. In 151 establishments there were employed 10,167 women and girls; these constituted a little over one-half (51.1 per cent.) of the working forces in the plants. Telephone exchanges showed 98.2 per cent. and cigar factories 95.1 per cent. of employees to be women and girls. The number of women in the tobacco industry—2,112, or 49.3 per cent. of the total number of employees—was larger than was found in any other occupation.

Kentucky permits a ten-hour day, and a sixty-hour week. It has no law prohibiting night work for women, and no law requiring one day of rest in seven. Although the actual hours of employment were found in many cases to be less than the legal hours, a large proportion of the women were working under such heavy schedules that it was a drain on their strength and vitality, and also a menace to the industry.

Kentucky is not one of the thirteen states which have a minimum wage law.

Of the 10,167 women and girls covered by the survey 12.6 per cent. were negroes. Of the 5,580 women whose nativity was ascertained only 1.1 per cent. were foreign born.

Rest rooms, lunch rooms, and sanitary arrangements were found to be inadequate.

Although the hours, wages, and working conditions of some of the women were based on high standards, the industrial life of the majority of wage-earning women showed need for much improvement.

Numerous statistics are given which show the results of the investigation in detail.—G. N. T.

WOMEN IN ARKANSAS INDUSTRIES. A STUDY OF HOURS, WAGES, AND WORKING CONDITIONS. *U. S. Dept. Labor, Women's Bur., Bull. No. 26, 1923, pp. 86.*

This study of the hours, wages, and working conditions of women in Arkansas was made at the request of the Commissioner of Labor and Statistics of that state.

Arkansas has a population of 1,752,204, and of this number 36.2 per cent. are engaged in gainful occupations. The largest number of women workers are employed in agriculture, the next largest number in domestic and personal service, and a small number in manufacturing and in stores.

General workroom conditions in 120 industrial plants in the state were reported. Of these 94 had clean floors, walls, windows, work tables, and other equipment. Heating appeared to be adequate in 101 plants and was partially satisfactory in 9 more. In 14 plants ventilation was thoroughly unsatisfactory, and in 20 the provision for fresh air was so inadequate that hot weather would result in excessive discomfort to the workers, an important point in this state where the hot weather extends over at least half the year. Lighting was judged satisfactory in 81 plants, partly satisfactory in 22, and decidedly unsatisfactory in 17. Seats were either insufficient in number or makeshifts in 27 cases. Fire hazards were frequently found, and 26 buildings had insufficient stairways or exits. There were no cloak rooms in 50 cases, no rest room facilities in 108. First-aid equipment was lacking in 63 plants. In 32 establishments occupational hazards of some kind were reported. Frequently the risk was of burns or of running slivers into the fingers; in the latter case, as in the case of power machines the needles of which occasionally pierce the fingers, the initial injury is slight but infection often follows. Strains incident to the job were reported to be greatest in laundries and woodworking establishments. In the latter, heavy lifting was sometimes required.

Proper equipment of drinking, washing, and toilet facilities has not been provided by the majority of employers in the state. The common cup or glass was found in 63 establishments. In 6 plants no washing facilities were furnished. Only 5 establishments supplied individual towels, 44 providing common towels. An insufficient number of toilet seats was noted in 80 establishments, 3 having no toilet facilities. Toilets in 49 establishments showed the result of neglect and bad cleaning arrangements.

It is recommended that the existing laws of Arkansas, many of which were violated by the conditions found, be made thoroughly effective by sufficient supervision and proper enforcement.—G. N. T.

Posture in Women's Work. *Nation's Health, July, 1923, vol. 5, pp. 462-463.*

This paper is a brief plea for proper chairs for women workers, for periodic changes in occupation that call for the use of different muscles, and for utilization of rest periods, either in complete rest or in exercising muscles not used in working time, in order that the evil results of cramped, strained, or awkward positions during long periods of work may be avoided.—K. R. D.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

The Optimum Illumination for Certain Work. *L. Bargeron. Ann. d'hyg., July, 1923, New Series, vol. 1, pp. 410-415.*

The author used the method of Luckiesh, Taylor, and Sinden (Jour. Franklin Institute, December, 1921) to determine optimum intensities. The method and its application are critically discussed. (In the original article by Luckiesh, Taylor, and Sinden the apparatus is described in detail with illustrations. On a horizontally placed drum, with adjustable speed, is pasted a sheet of special "old English" print. Through a small slot the observer reads the print and determines the optimum drum speed against the intensity of illumination. Curves are plotted with speed of drum and intensity of illumination as variables.)—P. D.

Lighting Code for Massachusetts Industries. *Nation's Health, July, 1923, vol. 5, pp. 460-461.*

A transcription of the code (effective Jan. 1, 1924) for lighting industrial establishments

adopted by the Massachusetts Department of Labor and Industries for the purpose of protecting employees from accidents and eye strain due to inadequate or faulty lighting.—K. R. D.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

WHAT 547 EXAMINATIONS DISCLOSED. *S. L. Bush. Hosp. Management, Oct., 1923, vol. 16, pp. 86-87.*

The Crocker-McElwain Company of Holyoke, Mass., has introduced compulsory physical examinations of applicants for employment in its plants and has met with very satisfactory results. This policy was adopted because several claims for accidents were brought up by employees when the company felt fairly sure that the trouble had originated prior to employment. Fortunately, pleasant relations existed between the company and its employees, and the latter endorsed the idea of physical examinations.

A part-time physician conducts the tests, and records are made covering the following points: sex, color, marital status, age, weight, height, eyes, ears, nose, throat, teeth, gums, temperature, pulse, arteries, blood pressure, heart, lungs, abdomen, extremities, reflexes, urinalysis, and genito-urinary findings. Up to July 1, 1923, 547 applicants were examined and corrective treatments were prescribed in 154 cases. Among the defects discovered were 55 cases of hernia (36 being first degree, 7 second degree, and 12 third degree), 32 cases of venereal disease, 13 cases of suspected tuberculosis, 29 cases of pronounced diabetes, and 27 cases of impacted wax in the ear. Of the 547 applicants, only two have been refused employment. The company's policy is to place men at the work for which they are best fitted by their physical capabilities and limitations. The applicants who needed treatment were told what to do in order to improve their condition.

The physical examination has been of triple value. It has enabled the company to place men at tasks for which they were best suited; it has served as a protection for old employees, guarding them against newcomers who might become a health hazard; and it has revealed unsuspected weaknesses and diseases to the applicants themselves and enabled them to take the proper corrective measures.—G. N. T.

NECESSARY CARE OF THE FOOT IN INDUSTRY. *J. Grossman. Nation's Health, June, 1923, vol. 5, pp. 375-381.*

Grossman emphasizes the importance to industrial workers of care of the feet, of the proper fitting of shoes, and of the correction of faulty habits of use. He discusses the cause and treatment of flat feet, bunions, hammer toes, metatarsalgia, corns, blisters, callosities, hypertrophy, and contusion of the nails, ingrowing toe nail, injuries and strains about the heel cord, spurs, osteitis and periostitis of the heel bone, and foot injuries, including fractures.

The article concludes with especial emphasis upon the following points:

1. All employees should have their feet examined periodically.

2. Foot exercises, proper orthopedic shoes and hosiery should be prescribed as preventive measures.

3. The feet should be protected against dampness and cold, by wearing woolen socks and rubbers. These should be insisted upon for out-of-door workers. It is an excellent way to prevent frost bite of the toes.

4. Injuries of the foot should receive prompt attention. Proper diagnosis and treatment are essential, so as to return the worker to usefulness as soon as possible and in as normal a condition as is possible.

5. Proper hygiene of the foot should be practised.

6. Patients should not be returned too soon to their occupations, as haste makes waste, in a majority of these cases. Returning to work before healing has been complete will only tend to aggravate the pathological condition present and in that way prolong invalidism.

7. Institution of these simple precautions with regard to the care of the foot in the various industries would tend to keep suffering, loss of time and invalidism at a minimum.—K. R. D.

INDUSTRIAL PERSONAL AND COMMUNITY HYGIENE: HOUSING, ETC.

INDUSTRIAL HOUSING. *Indust. Welfare, July, 1923, vol. 5, pp. 185-188.*

Industrial housing schemes have been extensively carried out in Great Britain, judging by the examples given in this article. The tendency is confined to no particular class of business, the experience cited being from such widely different lines as carpet manufacturing, the chemical industry, shipbuilding, and printing. In some cases, activities have been confined to the erection of semi-detached houses for the higher class of employees; in others blocks of workmen's dwellings have been provided. Acute housing shortage, desire to keep good workmen close to the plant, and government aid have been some of the factors causing this movement. The general plan is for the company to erect the dwellings and rent them to employees as long as they work for the concern. One company sells houses on small annual payments. Testimony is given that such provision for adequate, comfortable housing has a good mental and moral effect on the employees, and indirectly results in increased efficiency. —G. N. T.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

MINERS' WELFARE FUND. *First Report, 1921-1922. H. M. Stationery Office, 1923.*

The British Mining Industry Act, 1920, decreed that a levy of one penny on every ton of coal raised should be paid into a fund, and that the fund so raised should be used for improving the social well-being, recreation, and conditions of living of workers in and about coal mines, and for mining education and research. The levy, owing to the large tonnage of coal raised, brings in a sum amounting to one million pounds sterling annually. The statutory committee appointed to allocate the fund tell, in the report now under consideration, how the work has been going forward. The fund represents a new venture in industrial welfare in that a great industry is called upon to raise money in the interests of the workers, and further that, subject to the supervision of the central committee, the money is expended in accordance with the wishes of local committees composed of employers and workers.

The Mining Industry Act has only a five-years' life, but if the future reports on the expenditure of the fund are as satisfactory as the present one, the case for continuing the Act will be hard to resist. The central committee is composed of five members: Lord Chelmsford (Chairman), Sir William Walker (Ex-Chief Inspector of Mines), Mr. A. L. Wright (Mine Owner), Mr. H. Smith (Miners' Federation), and Prof. E. L. Collis. They tell of their initial difficulties in constructing local organizations and in establishing methods of procedure. Once these administrative details were settled, their motto has been expedition. During 1922 over half a million pounds were allocated among 261 schemes; less than half the income, it is true, but essentially satisfactory when one considers the preliminary work which had to be done in setting on foot each scheme and in spreading a knowledge of the possibilities and scope of the fund. The bulk of the schemes (125 of the total) deal with recreation, while ninety-nine are concerned with institutes, clubs, and libraries. Medical objects are fairly represented. About £100,000 have been devoted to hospitals, nursing services, ambulance service, and convalescent homes, and about £30,000 to pithead baths and washhouses.

Capital plans are given showing the layout of recreation grounds; a miners' institute is shown in plan and in existence; but the most ambitious scheme is the Ayrshire district convalescent home for which Kirkmichael House has been acquired. Two illustrations are given showing this stately mansion with its beautiful grounds and lake, almost sufficient in themselves to prove the value of the welfare fund and its meaning for the mining population.

The fund is divided into two parts: four-fifths are used in the localities where the levy is raised, and one-fifth is devoted to general objects. The money allocated for local pur-

poses is for the most part used to supplement local effort; for instance, to erect an institute which will be maintained by contributions, or to lay out for recreation ground which has been given by colliery owners. The other part of the fund is being devoted to technical research on safety in mines, and to schemes of education for miners. In these two directions progress as yet lies rather in the future than in the past; but the foundations are laid and the next annual report may be expected to tell of much done and set going.

The committee believes that the chrysalis stage of its existence is over and holds that, given sincere goodwill and co-operation, the Miners' Welfare Fund will come near to transforming the whole social life of the coal-mining community. The progress already made indicates that the faith of the committee is well founded. Unrest has distinguished the coal miner probably more than any other worker; the medical sociologist who sees in unrest only a symptom of underlying mental and physical irritation brought about by industrial conditions will watch with interest the result of this large scale and comprehensive experiment in welfare.

DEVELOPMENT OF JOHN B. STETSON COMPANY'S WELFARE ACTIVITIES. *Nation's Health, Sept., 1923, vol. 5, pp. 627-628.*

Cash benefits, a building and loan association, a bonus system, a savings fund, sanitary working surroundings, medical service, cafeterias, and recreational opportunities are features of the welfare activities of the John B. Stetson Company.—K. R. D.

WELFARE OF COLORED WORKMEN AT ARMCO. *Nation's Health, July, 1923, vol. 5, p. 437.*

The welfare activities of the American Rolling Mill Company at Toledo, Ohio, for its colored workmen include bachelors' clubs, with dormitory and dining accommodations and recreational facilities; cottages with gardens; a colored club hospital; visiting nurses and a social welfare worker; and educational classes both in the common branches and in various trades.—K. R. D.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

PROTECTING THE BELGIUM WORKER'S HEALTH. *D. Glibert. Nation's Health, July, 1923, vol. 5, pp. 424, 425, 486, 489.*

Glibert reviews in some detail industrial health legislation in Belgium from the Act of 1810, which granted to mine officers extended powers permitting them to impose on the industries within their jurisdiction measures for the protection of the workers' health, through the Act of 1921, which limited the working day of the adult male to eight consecutive hours.

Along with the development of state medical and hygienic machinery the organization by the workers themselves of health and sickness insurance societies has tended to promote the establishment of an intensive industrial health service.

Sanitary service in Belgian industry includes organizations in 903 industrial concerns employing 523 doctors, a part of whose service is the continuous health supervision of 23,481 young people. Moreover, health is promoted both by opportunity and necessity, for the law demands penalties from both workmen and employers for its transgression. —K. R. D.

DOUBTFUL CLAIMS FOR COMPENSATION. *S. Ingham. Safety Engin., June, 1923, vol. 45, pp. 186-188.*

This short article presents a number of cases of very different conditions in which compensation has been claimed and in some instances has been paid, but in which the claimants have not had legitimate claims.—R. M. T.

OCCUPATION DISEASES UNDER THE FEDERAL COMPENSATION LAW—OPINION OF THE ATTORNEY GENERAL. *U. S. Month. Labor Rev., June, 1923, vol. 16, pp. 213-220.*

The federal employees' compensation law provides for compensation for disability or death resulting from "personal injury" sustained while in the performance of duty. The United States Employees' Compensation Commission in administering the law had for

a period of about six years construed the term "personal injury" to cover not only injuries by accident, but also any injury by disease bearing a direct causal relation to the conditions of employment. A statement prepared by the Commission shows the reasons which led to this construction of the law when it was first made, soon after the organization of the Commission in 1917.

A brief of the decisions rendered by the Employees' Compensation Commission and the detailed opinion of the Attorney General regarding the legality of the Commission's construction of the law follow.—R. B. C.

DISEASE AS A COMPENSABLE INJURY. *L. D. Clark. U. S. Month. Labor Rev., July, 1923, vol. 17, pp. 196-202.*

"The legislative enactments known as compensation laws have received varying constructions in the courts of different states as regards the inclusion of diseases. Some state courts have regarded them as a mere substitute for the old doctrine of employers' liability for accidental injury, the principal change being the elimination of the question of negligence. Indeed many of the laws use the term 'accidental' in describing the nature of the injury for which compensation is available. On the other hand, some legislatures have, either by direct provision or by the use of more inclusive terms, made it possible to consider disease incurred by reason of the employment as entitling to the benefits of the act. However, even when the broader language was used, apparently opening the door for a more liberal construction, some of the local courts have been unwilling to accept the inclusion, and have held the scope of the law to the narrower limits of accidents."

After citing a number of illustrations, the writer concludes as follows: "The foregoing collection of decisions illustrates a considerable variety of circumstances, involving not only what are usually classed as occupational diseases, but also diseases of general occurrence having their inception in conditions due to the employment. The diversity of decisions is such as to indicate the necessity for clarifying legislation as well as the desirability of more uniform action in the different jurisdictions."—R. B. C.

REHABILITATION OF DISABLED EMPLOYEES

INDUSTRIAL REHABILITATION IN OREGON. *Nation's Health, June, 1923, vol. 5, p. 374.*

As a regular feature of its workmen's compensation system, the state of Oregon has undertaken the physical rehabilitation and, when necessary, the vocational retraining of its injured workmen. Physical reconstruction clinics have been potent factors in reducing expenditures for time lost and for permanent partial disabilities and in saving the state from an increasing number of permanent cripples.—K. R. D.

OREGON LEADS IN REHABILITATION OF INDUSTRIALLY INJURED. *F. H. Shepherd. Nation's Health, Aug., 1923, vol. 5, pp. 517, 518, 576, 578.*

A law of the state of Oregon is designed to facilitate the return of victims of industrial accidents to the industries. The money for this work is derived from a certain sum set aside from the workmen's compensation fund and is replenished as used by a definite percentage of the amount paid in by the employers and employees to the fund. The administration of this sum is left entirely to the State Industrial Accident Commission consisting of three men who make rules and regulations and work out methods of accomplishing vocational rehabilitation. Numerous cases are cited to indicate the success of the commission's work in retraining injured workmen and rendering them self-supporting.—K. R. D.

ABSTRACT OF THE LITERATURE

OF

INDUSTRIAL HYGIENE

VOLUME V JANUARY, 1924 NUMBER 9

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GENERAL

SECOND ANNUAL REPORT OF THE SECRETARY FOR MINES FOR THE YEAR 1922. *H. M. Stationery Office, 1923, pp. 195.*

This publication reviews the work of the Mines Department during the year 1922. It contains much valuable information regarding the output of minerals, the number of persons employed, and steps taken to insure the safety and health of miners. Special interest attaches to the work of the Miners' Welfare Committee and the expenditure of the fund at their disposal, to which reference has already been made in THIS JOURNAL (Dec., 1923, vol. 5, Abstr., p. 176). The Mines Department has appointed a Medical Advisory Committee to supervise researches into health questions. The subject of miners' nystagmus has already been reported upon by a committee which decided that this disease is associated with dim illumination. Beat hand, beat knee, and beat elbow, which are essentially miners' diseases, are under investigation; steps are being taken to investigate the morbidity and mortality of coal miners; researches are being continued into the effect of stone dust on the workers; the physiological reactions of men employed in deep and hot mines are being studied.

A Committee on Miners' Lamps is following up the Report of the Miners' Nystagmus Committee and introducing into the industry electric cap lamps and pillarless electric lamps, which it is hoped may prove of value in improving mine illumination. But little

progress is reported in the installation of pit-head baths; in this respect Great Britain is far behind most other countries.

The report indicates a greater liveliness in this department than existed before it was constituted as a separate organization.—E. L. C.

Occupational Diseases in South African Mines. *Internat. Labour Rev., Oct., 1923, vol. 8, pp. 593-594.*

The dust sampling department of the South African Chamber of Mines carried out four dust surveys during 1922; the average dust content per cubic meter of air was 1.6 mg. A disturbing element in measuring the dust content of mine air by the konimeter method has recently been detected. It arises from the fact that varying quantities of soluble salts contained in the water used in mines crystallize in minute particles on the konimeter slide when water is atomized or sprayed into the air. Under the microscope they resemble silica particles and have been wrongly counted as such.

Among 13,457 European mine employees examined during 1922 by the Miners' Phthisis Medical Bureau, only fifty-nine had to be warned as to the state of their health. The liberal use of water for dust prevention does not result in undue prevalence of rheumatism or Bright's disease. Only twenty-two cases of simple tuberculosis were discovered. The prevalence rate of tuberculosis with silicosis in 1917-1918 was 860 per 100,000; in 1921-1922 it was 178.—M. F. M.

Work on Automatic Looms from the Standpoint of the Industrial Physician. *F. Koelsch. Arch. f. Hyg., 1923, vol. 93, pp. 177-186.*

Before the war the German workman could tend sixteen automatic looms and produce 4.2 meters an hour on each, or 3,897 meters during his fifty-eight-hour week. In the same factory after the war the workers will tend only twelve looms, producing on each 3.7 meters an hour. As their week is only forty-six working hours, each man produces only 2,042 meters, or 47 per cent. less than before the war. The old style hand loom weaving shows no such marked falling off in product—only 20 per cent. less than formerly because of the shorter working day. The weavers are now complaining that twelve looms are too many, that the work causes injury to their health, nervous disorders, early exhaustion, premature old age, and abdominal disorders due to the continual pressure against the abdomen when the man leans over the loom to tie knots.

Koelsch examines these statements and finds them without foundation. A comparison of the output per man of factories employing men on four, six, or eight looms with those on twelve looms showed that the output of those on twelve looms was nearer to the theoretical 100 per cent. than that of the others. A comparison of the age groups showed that the output was greater in the group over 50 years of age than in that between 20 and 29 years. Koelsch finds that there is no pressure on the upper abdomen; except in very short persons the pressure comes against the pelvis. Moreover, the sickness insurance letters showed very little complaint of abdominal disorders. There is much less sickness of all kinds among the automatic weavers than among the hand weavers. He is not willing to admit that there is any undue nervous strain from the complexity of the work, the continual attention required, or the noise, and he believes that there is little monotony. He admits the importance of factory construction and maintenance especially with regard to light, ventilation, heat, and humidity. He favors returning to the sixteen-loom system and would even go as high as twenty looms, believing that this is without danger to the worker and is the only way to enable Germany to meet the competition of the United States, where one man tends as many as sixty looms.—A. H.

The Dimensions of the Hand in Different Occupations. *E. Brezina and V. Lebzelter. Arch. f. Hyg., April, 1923, vol. 92, pp. 53-59.*

The authors made careful measurements of the hands of 1,200 persons employed as blacksmiths, locksmiths, foundry workers, brick makers, electric railway employees, typesetters, and employees of postal savings banks. They found that manual work has a marked effect on the breadth and thickness of the hand but not on the length. The blacksmiths stood at the head of the list, the typesetters and clerks at the foot. They discuss the influence of choice of occupation up-

on these findings and believe that it is important, for the powerfully built individual is more likely to become a blacksmith than a typesetter. The dynamometer tests showed that the typesetters and clerks had the least strength. In all occupations there was a decided falling off in dynamometer readings after the fortieth year.—A. H.

Health Facts in Support of the Five-Day Week for Painters. *New York District Council No. 9, Brotherhood of Painters, Decorators and Paperhangers of America, 1923, pp. 31.*

By providing regular physical examinations for members, the Brotherhood of Painters, Decorators, and Paperhangers have adopted an effective preventive measure. Careful instruction on the importance of hygienic precautions is also included as a vital part of the health program. Such instructions cannot be carried out during working hours unless painters have proper toilet facilities, plenty of drinking water, and a chance to wash up before eating. These are merely the minimum sanitary safeguards, but they are necessary as preventive measures against lead and other poisons.

The responsibility for continuing dangerous working conditions rests with the employers. Experimentation with cheap paints for the mere sake of economy at the expense of the health of the workers must cease. In the meantime it is imperative that painters reduce their hours of exposure to trade dangers by limiting the working week to a maximum of forty hours.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

Carbon-Monoxide Hazards from Tobacco Smoke. *G. W. Jones, W. P. Yant, and L. B. Berger. U. S. Bur. Mines, Rep. Investigations, Serial No. 2539.*

Tests were made to determine (*a*) the amount of carbon monoxide present in a non-ventilated room in which tobacco smoke was liberated by smoking, and (*b*) the extent to which it was absorbed by the smokers. The percentage of carbon monoxide present was never greater than 0.02 per cent., and the percentage of carbon monoxide saturation of the blood was not greater than 5 per cent.

Tests were made to determine why a smoker does not absorb more carbon monoxide into his blood. These tests showed that concentrated smoke does not reach the alveoli of the lungs, and that the maximum average concentration of carbon monoxide drawn into the lungs would not be greater than about 0.01 per cent.—M. F. M.

Annual Meeting of the Hungarian Ophthalmological Society. Budapest, May 19, 1923. *Klin. Wchnschr., Sept. 3, 1923, vol. 2, p. 1718.*

B. v. Howáth reported a case of amaurosis following illuminating gas poisoning. After one day's unconsciousness, amaurosis and encephalitis hemorrhagica developed. The fundus was normal. After two months vision was 2/15. The papillae were slightly pale. Because of the absence of hemianopsia, the author thinks that the visual center is not directly involved but that visual acuity is affected as a result of a localized hemorrhage or encephalitis.—J. W. S. B.

Hygiene of Brass Foundries. *S. W. Greenbaum. New York City Dept. Health, Month. Bull., Sept., 1923, vol. 13, pp. 199-200.*

Hazards of the brass foundry are as follows: (1) fumes causing "shakes" and metallic poisonings; (2) burns from molten metal or from acids; (3) dust from sand blasting, "buffing," or polishing causing injuries to the eyes, nose, and lungs.

Brass founders' ague or the "shakes" occurs most frequently in beginners, or on Mondays, or after a lay-off or vacation. Old workmen who work steadily seem to acquire a certain immunity. It is more prevalent in winter than in summer and occurs more frequently in muggy weather. Zinc oxide fumes are the cause. The symptoms are: On going into the open air, or sometimes not until taking off the clothes to retire, the work-

man gets chilly and cannot make himself warm. He shakes all over. This lasts from three to twenty hours and is sometimes followed by a fever. The next day he feels normal but somewhat exhausted and may have a metallic taste in his mouth. The best treatment is plenty of hot milk, warm covers, and rest in bed. Usually an emetic and a dose of salts are very beneficial. The theory has been advanced by Professor K. B. Lehmann of Wurzburg that the "shakes" are caused by the destruction, by the zinc oxide fumes, of some of the cells lining the respiratory tract and that the absorption of products from these dead cells causes the symptoms.

Suggestions for lessening the hazard of "shakes" are: (1) Abolish the use of gas furnaces, which give off more fumes than coal furnaces, have inferior draught, and produce carbon monoxide in addition to fumes. (2) Require a minimum height of 25 feet for rooms in which brass is poured. (3) Encourage the use of an alloy containing aluminum, thus providing for lower melting temperatures and decreased zinc fumes. (4) Encourage the use of a blower system in the floor with an exhaust in the ceiling. (5) Lessen the number of workers exposed to fumes by partitioning off the rooms in which melting or pouring is done. (6) Lessen the fumes 85 per cent. by using the new method of pouring in brass casting illustrated on page 30 of Kober and Hanson's "Occupational Diseases."

Burns may be prevented by care and by the use of gloves and leggings during the pouring. Face masks should also be used where there is danger of molten metal sputtering and burning the face.

Sand blasting and buffing should be done under glass, with an efficient exhaust to take away the dust. Wire screens provide little protection.—G. N. T.

LEAD AND ZINC POISONING IN ACETYLENE WORKERS ENGAGED IN WRECKING. *R. Engelsmann. Klin. Wchnschr., Oct. 8, 1923, vol. 2, pp. 1884-1887.*

Analysis of air in the neighborhood of rivets and elsewhere gave 4.5 and 6.8 mg. of lead in 100 liters of air.

Of thirty-nine wreckers and one painter who were thoroughly examined, nineteen gave a history of symptoms of lead poisoning and thirty-two gave a history of symptoms of zinc fever. Lead lines were positive in nine and questionable in four; twelve showed basophilic stippling. The author also emphasizes the importance of urinary sediment, as thirteen cases without albuminuria showed leukocytes and renal epithelia.

Further examination of sixty wreckers gave a total of ninety-nine, in whom a lead line was found positive thirty-three times and questionable thirteen times. Lead line and basophilia together were found twenty-seven times—if questionable cases are included, thirty-eight times; lead poisoning symptoms were found in eight cases, or thirteen, if questionable cases are included.

The author considers the relations between basophilia, lead line, and poisoning. Stippling appears first; stippling and lead line are signs of absorption and may be present without symptoms. An undetermined factor is required before poisoning occurs. He quotes a case where three stippled cells per field were found without lead line or symptoms, and makes a plea for more extensive study to find objective signs of threatened and fully developed lead poisoning.

He closes with a list of recommendations from the Ministry of Labor for the prevention of lead poisoning in wreckers.

A bibliography is appended.—J. W. S. B.

LEAD-CONTAINING VAPOR FROM WHITE LEAD PAINT. *Herman. Abstr. as follows from Scalpel, 1923, vol. 76, pp. 1-7, in Zentralbl. f. d. ges. Hyg., June 25, 1923, vol. 4, p. 217.*

The author detected lead in a piece of filter paper which had been kept in a desiccator with white lead paint (mixed with linseed oil). A stream of air was passed over a freshly painted surface and then filtered through sand. Lead was found retained in the filter. After painting the wall of a room with paint containing 375 gm. of white lead, 125 gm. of linseed oil and turpentine, and 5 gm. of a drying substance, the author was able, by holding a slide 50 cm. from the painted surface, to collect droplets of paint measuring about 15 microns in diameter.—A. S. M.

DUST HAZARDS AND THEIR EFFECTS

THE PRODUCTION OF AN INDUSTRIAL DISEASE OF THE TEETH BY SUGAR DUST. *H. Gerbis. Abstr. as follows from Deutsch. Monatsschr. f. Zahnheilk., 1923, vol. 41, pp. 141-148, in Zentralbl. f. d. ges. Hyg., June 25, 1923, vol. 4, pp. 216-217.*

Trade unions should emphasize the importance of dental prophylaxis in the sugar industry. Typical caries develops in the upper part of the teeth of persons exposed to sugar dust. This appears at first as a rich deposit of tartar but rapidly progresses until the tooth breaks off unless properly attended to. No one working in the sugar industry for more than ten years has a perfect set of teeth and in almost 45 per cent. of the workers the teeth are fully destroyed.—A. S. M.

THE APPLICATION OF STONE DUST IN COAL MINES. *Safety in Mines Research Board, Paper No. 2. H. M. Stationery Office, 1923, pp. 58.*

This report is an important one, touching as it does upon two aspects of the hygiene of miners. Stone dust is used on the sides, floor, and roof of the roads and passages of coal mines to act as a barrage to an explosion wave. An explosion sends a wave ahead of the combustion which causes it; if this wave finds combustible dust lying in its track it lifts the dust into the air, where it becomes material for combustion and further transmission of the explosion; but if combustible dust, such as coal, is mixed with a sufficiency of inert stone dust, then combustion does not occur and the explosion wave is stayed.

This report discusses the best way of dusting coal mines, the methods for ascertaining whether it is effective, and the best materials to use. The conclusion is arrived at that to be non-explosive the dust in the roadways must contain about 50 per cent. by weight of incombustible dust which will pass through a 200 by 200 sieve. Clearly, the finer the dust the better, and the question arises whether the presence of such dust in the roadways may not subject the miners to a new danger from dust inhalation while guarding them against risk of explosion. This new risk must depend on the kind and amount of dust used and the frequency of its application. Dusts containing free silica are interdicted and also dusts of a gritty nature. The amount required varies from 70 to 180 pounds per annum per linear yard of roadway, and the frequency of application from three times a month to twice a year. The possibilities of risk from inhalation are recognized and are probably being sufficiently safeguarded. The methods of application are: by hand, by mechanical dust sprayers, or by distribution by ventilation current; efficiency appears to be in the order named. The report gives the results of much research work carefully carried out.—E. L. C.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

OCCUPATIONAL DERMATOSES. *O. Sachs. Abstr. as follows from Dermat. Wchnschr., June 26, 1923, vol. 76, p. 582, in Arch. Dermat. and Syph., Nov., 1923, vol. 8, pp. 726-727.*

In a long and comprehensive article, the author considers the occupational stigmas, burns, freezing, cauterizations, affections of the sebaceous and sudoriferous glands, occupational affections of the nails, toxicodermas and trade eczemas, melanodermas, dermatoses due to exposure to dyestuffs, electric burns and roentgen-ray effects, infectious diseases attendant on occupations, epitheliomas, and the subjects of prognosis, prophylaxis and therapy.

NOTE ON "BAKERS' ECZEMA." *A. R. Tankard. Lancet, Aug. 11, 1923, vol. 205, pp. 279-280.*

A journeyman baker called upon the writer to show his forearms, which presented a definite eczematous condition up to the elbows. A number of other bakers were similarly afflicted, at times so severely as to make it difficult for them to continue their employment. The trouble apparently originated in one special kind of flour. Study of patent literature dealing with so-called "improvers" added to flour revealed potassium persulphate as the substance most likely to cause skin irritation. This chemical when moistened yields potassium acid sulphate. Investigation of the sus-

pected flour showed potassium persulphate to be present. Action was taken against the miller under the Sale of Food and Drugs Act, but the case was dismissed, the law not being effectual in stopping such additions of chemicals. It is the writer's opinion that salt in the yeast mixture or dough does not cause eczema, as has been suggested; if it did, such trouble would have been common among bakers for years. He believes that potassium persulphate is solely responsible, since in his own experience (1) only when flour containing potassium persulphate was being used was any skin trouble evident, and then only when the flour was handled in a moistened state; and (2) when this flour was not used, but flour free from potassium persulphate substituted, with salt, yeast, etc., as usual, no trouble was experienced and the eczematous condition of the skin of the affected workers gradually disappeared.—G. N. T.

Corneal Injuries in Industrial Occupations. *F. Allport. Ill. Med. Jour., Aug., 1923, vol. 44, pp. 128-133.*

This article describes methods of treatment for the removal of small foreign bodies from the eye. Among the most frequent accidents in industrial work are those cases where such bodies are driven into the eye from emery wheels or other objects. Particles flying through the air from smoke stacks or dirt from the streets are another source of trouble. The first class of bodies is usually rendered aseptic by the force of the blow; the second class is usually septic and may be the initial cause of infection. Extreme care is necessary in either case, no matter how apparently trivial the injury. When the foreign body is firmly lodged in the corneal tissues, removal must be effected under strong light, with the aid of a magnifying lens and with conditions of strict cleanliness. Three rules are emphasized: (1) Get the instrument under the foreign body if possible and lift it out; (2) injure the cornea as little as possible; (3) always work under ample and concentrated illumination.

After removal of the body and appropriate antiseptic treatment the eye should be protected by a pad. This prevents irritation and infection from the air, and the invasion of the eye by additional irritating foreign bodies. Ignorant and selfish employers sometimes protest at not returning the patient immediately to work, forgetting that proper care is a protection against heavy damages for lost eyesight as well as the means of conserving the vision of the unfortunate injured man. Corneal ulcerations are dangerous and spread with incredible speed; therefore apparently trivial corneal injuries should be treated immediately and with the greatest care.

The author states that in the treatment of bad corneal ulcers and their sequelae he has been much disappointed in the use of subconjunctive injections of bichloride, salt, dionin, etc. He always searches for outside causes such as syphilis, kidney lesions, diseased teeth, tonsils, sinuses, and lacrimal diseases. X-ray pictures and modern transillumination are of great assistance in searching for these causes. If he finds any focus of trouble he tries to relieve it as far as is consistent with the patient's ocular condition. His method of treatment for some of his findings is outlined in this article, and he states that he has seen removal of the tonsils or diseased teeth, and draining of some of the head sinuses play a wonderful part in apparently hopeless cases of ocular infection.—G. N. T.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

Causes of 350,000 Industrial Accidents Analyzed by Insurance Companies. *National Bureau of Casualty and Surety Underwriters, 1923.*

This report presents the results of an analysis of the causes of 350,000 industrial accidents made by the National Bureau of Casualty and Surety Underwriters for the National Council on Compensation Insurance. The most striking revelation of this analysis is the seriousness of the point of operation on machines as an accident factor. The point of operation is the accident cause to which workmen are exposed the greatest part of their time and is the part of a machine which is most difficult to guard. Because of the tendency in industry to substitute mechanical for manual operations, machine accidents are

bound to cause an increasing proportion of the total accidents.—M. F. M.

ESTIMATED ANNUAL NUMBER AND COST OF INDUSTRIAL ACCIDENTS IN THE UNITED STATES. *C. Hookstadt. U. S. Month. Labor Rev., Nov., 1923, vol. 17, pp. 1-9.*

"Although hundreds of thousands of dollars are being expended annually upon accident prevention work in the United States, yet year after year industry takes its toll of thousands of deaths and millions of injuries. In view of the extensive safety activities which have been carried on by State departments, private safety organizations, insurance carriers and individual employers, it would seem that the number of accidents would show a constantly decreasing tendency. This, however, is not true. In general it may be said that the number of industrial accidents has varied directly with the volume of employment. Present indications point to an exceptionally large number of accidents for the year 1923—in some States more than have ever before been reported. That the increased safety activities have resulted in accident reduction would seem probable, but because of the absence of uniform and reliable statistics, particularly the lack of accident frequency and severity rates, the extent and nature of this reduction, if any, can only be surmised."

The author supplies four tables bearing on industrial accidents and fatalities and the estimated cost of such.—R. B. C.

WHO PAYS FOR THE ACCIDENTS? *R. V. Ageton. U. S. Bur. Mines, Rep. Investigations, Serial No. 2535.*

Information regarding the costs and causes of metal-mine accidents obtained from a study of the accident and medical reports of two large metal-mining companies which carry their own insurance is presented in this report. The statistical tables presented show that each accident costs the company more money for compensation and medical attention than it costs the men in loss of wages. Approximately 30 to 35 per cent. of the company's expenditure for accidents to employees is for hospital and medical services. Nearly half—48.1 per cent.—the injuries occur during the first two months of employment, and 20.5 per cent. occur in the first week. Consequently, if the work is on a contract basis, the employee when injured has not had sufficient training to reach his maximum earning capacity, or to give the company full value for the money paid him. —M. F. M.

COMPILING ACCIDENT RECORDS. *R. G. Adair. Nat. Safety News, Nov., 1923, vol. 8, pp. 29-30.*

The author believes that "the judicious use of accident records has played an important part in the prevention of accidents." The only accident statistics that are of value for practical purposes are those which show the frequency of accidents; those which show the severity; and those which classify accidents as to cause. The most satisfactory way of computing these is the method adopted by the International Association of Industrial Accident Boards and Commissions.

The record forms used by the American Rolling Mill Company are reproduced.—M. F. M.

THE AWARD SYSTEM AS A MEANS OF PREVENTING ACCIDENTS. *G. B. Anderson. Nat. Safety News, Nov., 1923, vol. 8, pp. 21-22.*

Under the bonus system a company shares with its employees who have good safety records the savings effected by accident reduction. This article describes the plan adopted by the Los Angeles Railway. At the beginning of the bonus year, every eligible employee starts with a rating of 100 per cent. Demerits are assessed for infractions of certain important operating rules, and the amount of the bonus which an employee receives depends on his record under this system.—M. F. M.

CHENEY BROTHERS' SAFETY METHODS AND APPLIANCES. *E. L. Bernays. Safety Engin., Aug., 1923, vol. 46, pp. 71-73.*

Because their mills are constructed so as to provide ample working space, adequate lighting and ventilation, and plenty of exits, the problem of safety has not been a very serious one for Cheney Brothers. Nevertheless, the most advanced safety methods have been adopted. Dangerous machines are provided with safeguards, and a great deal of attention has been paid to preventing ladder accidents, cuts and bruises from small tools,

and injuries from splinters. In buildings where a dust hazard occurs air washing systems have been installed, and problems of illumination have been carefully considered.

The Medical Division is equipped with a modern operating room and individual offices for the doctors and nurses. The personnel consists of three physicians, one of whom is an oculist and specialist in refraction; two local physicians who are subject to call; three registered nurses, two of whom are visiting nurses following up cases in the homes of workers; two dental hygienists; two laboratory technicians; an X-ray technician; and two clerks.

Cheney Brothers owns 392 houses, which furnish living quarters for 426 families, including 664 workers, or 16 per cent. of the entire working force.

The cost of statutory accidents for the year 1922 was 35 cents for each $100 of payroll. Cheney Brothers is self-insuring and pays compensation in excess of the amount stipulated by the state of Connecticut. This results in a saving that approximately offsets the cost of operating the medical department. —M. F. M.

Protecting the Blooming Mill Worker. *Nat. Safety News, Aug., 1923, vol. 8, p. 43.*

This article describes various devices used to protect rollers, manipulators, and engineers on blooming mill rolls from hot splashes from ingots, a hazard which is serious, particularly to the eyes. In most mills the operatives are protected by a "pulpit" over the tables and rolls which is provided with windows of plate glass from 3/8 to 1 inch thick. A somewhat less satisfactory safety device is the chain guard, which consists of short pieces of chain hung from a bracket in such a way that splashes from the ingots strike the chain. Safety switches in the pulpit, a light signal system between the pulpit and engine room, and fine mesh screens at the pulpit and rolls are also employed.—M. F. M.

Safety in the Forest Products Industry. *E. B. Wight. Nat. Safety News, Oct., 1923, vol. 8, pp. 47-48.*

About 50 per cent. of the workers in the state of Washington are employed in the forest products industry. During the past three or four years, accident prevention work has been introduced into mills and logging camps. It is not nearly so well developed in the woods as in the mills, because the great majority of workers in the camps are transients.

This article is largely a discussion of the psychology of safety work and of devices for keeping employees interested in the movement.—M. F. M.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

The Physiologist in Industry. *F. S. Lee. Indust. Bull., Oct., 1923, vol. 3, pp. 10-13, 23.*

This is a reprint of an article published in the July issue of the *Atlantic Monthly*. The author notes the slow growth in ways of improving the efficiency of the human machine up to the beginning of the war and the great accomplishments that have taken place since that time. The human machine is contrasted with industrial machines, stress being laid on its ability to perform a great variety of work and its tendency to become fatigued. The problem of fatigue, which appeared a simple one years ago, grows increasingly complex as research discloses the difficulties of the subject. Studies of mental capacities of individuals in the fresh and fatigued state have brought out such conflicting results that the whole subject is now in a maze of uncertainty. There are, however, indirect ways of demonstrating objectively the fatigue of the human body. When the worker is free within limits to choose his own pace and when he so uses his forces that as he leaves the factory at night he can honestly feel that he has accomplished a real day's labor, his curve of work from hour to hour reflects his physiological state. Studies of such curves are most valuable.

The output of the human machine, unlike that of the non-living mechanism, is increased by occasional rests. Among physical factors affecting efficiency, air is important. Not only should it be pure but its temperature and humidity should not be abnormally high. The human motor, like other motors, generates heat and must be continually air-cooled if its temperature is not to rise to an abnormal

degree. Energy is also wasted through needless, unproductive motions. "Time-and-motion study" if properly conducted will tend to prevent this without driving the worker to excessive speed. It must be remembered that the human machine is the seat of instincts and emotions which have a large influence on the quality and quantity of output.

Vital problems of labor are bound up with the peculiarities of the human machine. Within limits, a machine of flesh and blood will give increased production with decreased hours, in striking contrast to a machine of soulless steel. In endeavoring to decide upon the proper length of working day, consideration should be given first to the physiological aspect of the matter. Stimulated by the necessities of the war, various scientific investigations have been conducted which have thrown considerable light on the way for an employer to deal justly and economically with living machines. Further progress may be expected from such investigations.—G. N. T.

SOME EFFECTS OF HIGH AIR TEMPERATURES AND MUSCULAR EXERTION UPON COLLIERS. *K. N. Moss. Proc. Roy. Soc. B, Aug. 1, 1923, vol. 95, pp. 181-200.*

The food consumption of miners was determined by persuading sixty colliers to fill in accurate records over a period of twenty-four months. The mean daily calorie consumption of the collier was 4,711; but the food consumption increased with increase of temperature under ground. Possibly the increased physiological work involved in extra sweating at high temperatures may account for the extra metabolism. Workers in hot mines consumed a larger amount of salted foods and a larger proportion of butcher's meat than those working under lower temperature conditions. The amount of liquid drunk increased rapidly with increase of temperature above 70°. One miner in a hot mine drank 13.6 pints (17 pounds) of liquid per working day. The amount of salt taken daily in food varied from as much as 7.6 gm. in hot mines to 5.5 in cool ones.

The respiratory exchange of a miner at work and in a laboratory was determined by the Douglas bag method. When the ergometer equivalents for work done were deduced from the figures of oxygen consumption, the following averages were obtained:

		Ft. Lb. per Min.
1.	Cutting in bottoms.....	2,500
2.	Loading slack.....	4,000
3.	Cutting and erecting timber...	3,000

The amount of weight lost during work was noted. A trained miner was found to lose more than untrained persons doing the same work; but after a few weeks' holiday a miner took several days before attaining his normal rate of sweating. The average loss among thirteen miners amounted to 2.38 pounds per hour, and the sweat contained on an average 0.224 per cent. sodium chloride. The chlorides excreted were sodium chloride, 59.3 per cent., and potassium chloride, 40.7 per cent. At the same time the chlorides excreted by the urine diminished.

Men who sweat freely at work were subject to water poisoning, *i.e.*, to cramp in the arms, legs or abdomen, if they drank freely of pure water. But if they drank water containing 10 gm. of sodium chloride to the gallon they were found to escape cramp, to be better able to work, and to be less fatigued. This matter is of interest to others, such as marine firemen and steel smelters.—E. L. C.

APPARATUS TO INDUCE ARTIFICIAL RESPIRATION. *G. Panis. Abstr. as follows from Bull. de l'Acad. de Med., May 1, 1923, vol. 89, p. 469, in Jour. Am. Med. Assn., Sept. 29, 1923, vol. 81, p. 1150.*

Panis' apparatus applies artificial respiration according to the Schäfer method.—K. R. D.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

A FATAL CASE OF CAISSON DISEASE. *C. P. Archambeault. U. S. Naval Med. Bull., Aug., 1923, vol. 19, pp. 167-168.*

The patient, after diving to a depth of 120 feet, slowly ascended to a depth of 60 feet, removed his helmet, and immediately came to

the surface. Symptoms of caisson disease developed soon after, and unconsciousness followed. Treatment consisted in again lowering the patient to a depth of 60 feet and subsequently in placing him in a torpedo room at a pressure of 16 pounds, this pressure being gradually lowered. Good results were secured temporarily, the patient being apparently in fair condition. After an interval of half an hour, however, convulsions and unconsciousness came on. Repeated treatment at 16 pounds' pressure was unsuccessful.—G. N. T.

LIVE WIRE ACCIDENTS. *P. Balkhausen and H. A. Grueter. Abstr. as follows from Deutsch. Ztschr. f. Chir., July, 1923, vol. 180, p. 273, in Jour. Am. Med. Assn., Oct. 27, 1923, vol. 81, p. 1478.*

Balkhausen and Grueter comment on the comparative mildness of the changes found in the organs after a fatal accident from a live wire. Examination of an arm that had to be amputated, on account of gangrene from an electric burn, showed that extreme contraction and paralysis are special features of the action of the current on muscles and muscle nerves, and on the vessels and their nerves.—K. R. D.

WOMEN AND CHILDREN IN INDUSTRY

MARRIED WOMEN IN INDUSTRY. *M. N. Winslow. Soc. Hyg., Oct., 1923, vol. 9, pp. 385-395.*

The three factors which we must consider when trying to establish a standard regarding the employment of married women in industry are the economic needs of industry, the social needs of the family, and the human needs of the individual. Until it is possible and usual for the normal married man to support his family according to a decent American standard of living, intensive studies will be necessary to secure facts which will guide social thought and action on the employment of married women in industry.

In 1890 less than five of every hundred married women were gainfully employed; in 1920 nine of every hundred married women were gainfully employed. This increase in proportion represents an increase in actual numbers from 515,000 to nearly 2,000,000. In the manufacturing and mechanical industries, although the percentage of all women employed increased only 7 per cent. in the decade 1910 to 1920, the percentage of married women increased 41 per cent. In occupations connected with trade there has been an increase of 21 per cent. for all women, and an increase of 88 per cent. among married women. The trade, transportation, manufacturing, and mechanical industries, therefore, are the occupational groups which should be studied first.—M. F. M.

EMPLOYMENT OF WOMEN IN THE GERMAN TEXTILE INDUSTRY. *U. S. Month. Labor Rev., July, 1923, vol. 17, p. 143.*

The German Textile Workers' Union instituted an inquiry into the position of women in the textile industry to meet attacks on the eight-hour day. The inquiry was made as comprehensive as possible and included non-union as well as union workers. The results of the investigation showed that the majority (over 60 per cent.) of the workers in the textile industry were women, and that one-third of these were married women, most of whom were forced to contribute to the support of their families because their husbands' wages were insufficient. The union insists that in the regulation of hours of employment and other labor conditions these facts should be taken into consideration, and that steps should be taken to prevent injury to the health of women owing to excessive work in the factory and in the home, injury which endangers the health of the next generation.—M. F. M.

RECOMMENDATION CONCERNING THE PROTECTION OF WOMEN AND CHILDREN AGAINST LEAD POISONING. *Internat. Labour Office, Official Bull., Oct. 24, 1923, vol. 8, pp. 179-180.*

In August, 1920, the Chief Inspector of Factories in Norway requested all physicians to report every case of illness which could be regarded as arising from industrial poisoning. During the period Jan. 1, 1921, to June 30, 1923, only three cases of lead poisoning

were reported. As a result, existing legislation, which safeguards the health of children and pregnant women, is deemed sufficient until more adequate information concerning cases of lead poisoning can be obtained.—M. F. M.

Child Labor in Sugar Beet Fields in Kansas. *A. K. McFarland. Am. Child, June, 1923, vol. 5, pp. 4-5.*

The tenant system of beet farming is largely practised in this state. Land is leased by the company under a contract which requires that 40 out of every 160 acres must be planted in beets. Money is advanced tenants during the winter for supplies and is taken out of the returns of the beet crop. The general tendency among tenants is to fall deeper and deeper into debt to the company. Being financially unable to hire adult labor, the tenants depend on the work of their children. In the beet topping season hundreds of children must give up school, with consequent retardation in educational development.—G. N. T.

Child Labor in Tenement Homes Arouses All New Jersey. *Am. Child, Aug., 1923, vol. 5, pp. 1, 6.*

Jersey City is credited with starting a widespread movement when it investigated the employment of children in home sweatshops and prosecuted the responsible employers and parents. The State Department of Labor assigned its entire force to the investigation of home work by children throughout the state. Other investigations under local auspices were undertaken. Newspapers took up the matter editorially and politicians were moved to suggest remedial laws. There was a rush on the part of employers for licenses to give out work to be done in homes; these licenses were required by existing law but enforcement had been lax. Jersey City's own activity in the prosecution of offenders has temporarily slackened because of legal obstacles. Its investigators, however, continue to unearth undesirable conditions and to give them much needed publicity.—G. N. T.

Summary of State Child Labor Legislation, 1923. *Am. Child, Aug., 1923, vol. 5, pp. 1, 7.*

During the year, Wisconsin, Delaware, and Rhode Island have all made definite progress in child labor standards. An attempt was made in Pennsylvania to establish an eight-hour day for minors, but this was unsuccessful. In Ohio, the Governor vetoed a bill permitting all children over 10 years of age to work thirty-six hours a week when school was not in session. A definite but unsuccessful attempt was made in Wisconsin to regulate child labor in cherry orchards, sugar beet fields, and cranberry bogs. The only backward step was taken by Michigan, which passed a law reducing from 21 years to 18 years the age at which females may work at dangerous machinery.—G. N. T.

The Welfare of Children in an Industrial Community. *M. V. Hamilton. Nation's Health, Oct., 1923, vol. 5, pp. 697, 698, 750, 753.*

Eight years ago the Dwight Manufacturing Company of Alabama undertook a campaign to promote the physical welfare of the mill children of its community. The trained nurse, who is also a trained social worker, begins with the education of the pregnant mother. The child is carefully watched from the moment of birth and is closely followed throughout its activities whether at home, at school, or at play. The result of these efforts has been the reduction of the mortality of infants up to 2 years of age from 18 per cent. in 1916 to 5 per cent. in 1922.—L. A. S.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

Are your Buildings Properly Lighted? *A. C. Carruthers. Safety Engin., Oct., 1923, vol. 46, pp. 186-189, 191.*

The importance of proper and adequate lighting in industrial plants as a primary and fundamental requirement in safeguarding against accidents is pointed out in this article. Emphasis is also placed on the increased light intensity that obtains from periodic cleaning of windows. Several illustrations show-

ing the gain in intensity of illumination by the cleaning of glass areas are given.—R. M. T.

Relighting the Factory—an Aid to Better Quality. *T. H. White. Factory, July, 1923, vol. 31, pp. 42-44.*

The lighting equipment of the White Motor Company's factory formerly consisted of overhead lamps of from 100 to 200 watts with shallow dome reflectors spaced as far as from 15 to 20 feet apart. The illumination given at night by this equipment varied from 3 to 10 foot-candles, with considerable lack of uniformity. Often in the daytime and at night it was necessary to supplement this overhead lighting with individual lamps mounted on adjustable brackets fastened to the machines. This system failed to provide sufficient or uniform illumination, and conditions of glare due to the use of clear glass in the unshaded overhead units and local lighting were serious.

As a result of an exhaustive lighting survey, 300-watt lamps were adopted, and switches were placed in such a way as to provide lighting on 10 by 10, 10 by 20, and 20 by 20 foot centers. This system provides sufficient illumination for any operation. Since dust, dirt, or oil upon lamps or reflectors often results in a loss in intensity exceeding 40 per cent., provision is made for regular cleaning.

Although the new arrangement has not yet been installed in all departments because of the expense involved, it has resulted in more efficient production in the departments in which it is in use.—M. F. M.

A Study of Visual After-Sensations with Special Reference to Illumination in Coal Mines. *E. Farmer, S. Adams, and A. Stephenson. Brit. Jour. Psychol., vol. 14, Part 2, pp. 151-163.*

The number and duration of visual after-sensations in the dark were studied and found maximal at the fovea and minimal at the retinal periphery. Diffused light reduced visual after-sensations, but, even though the intensity of illumination was thereby reduced 28 per cent., it did not reduce visual acuity. The coal miners were found to experience after-sensations from their lamps to a pronounced degree, but to a far less degree when the light was diffused by painting the outside glass of their lamps with hydrofluoric acid. The authors suggest that after-images from miners' lamps may be a contributory cause of miners' nystagmus. Some hundreds of lamps so treated have been brought into use at one colliery; they are in demand by the miners, who consider them a great improvement.—E. L. C.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

The Physical Examination of Apparently Healthy Individuals: Its Importance, Limitations and Opportunities. *R. I. Lee. Boston Med. and Surg. Jour., June 14, 1923, vol. 188, pp. 929-937.*

At the present time our so-called civilized communities in the temperate zones have seemed to reach a nearly fixed level so far as mortality and morbidity rates are concerned. While the battle against mortality and morbidity is going on in a vigorous way, attention is being directed toward perfecting health. The present generation is no longer satisfied with the avoidance of death or the prevention of disease. The emphasis is being shifted from health as a negative liability taken in the sense of freedom from illness to health as a positive asset.

Great things have been predicted of periodic physical examinations. These examinations are of undoubted value, but experience has shown that even when they are frequently repeated by competent men they may fail to disclose positively every disease in its earliest stages. They do, however, have a value beyond that of being the starting point for the correction of discovered defects. They are of great value in the opportunity they give for individual instruction in rules of health to those who are examined. They help to rid persons of notions that they have certain defects.

It must be borne in mind that there is yet no general agreement as to what constitutes a normal individual. Everything depends upon the particular standard adopted. It is thus evident that statistical data derived from physical examinations must be interpreted in the light of the arbitrary standards that are used. There may also be complicating factors which need consideration in the adoption of a standard of physical fitness for a given occupation.

It is perhaps largely on account of lack of defined standards of health that physical examinations have not yielded the results so confidently expected of them. What is important to know is how the individual as a whole can undertake the affairs of life rather than to befog the issue with an array of defects which, though permanent, may in no way interfere with his future field of usefulness.

An adequate physical examination must fulfil three important purposes: (1) the detection of organic pathology, to be followed by the necessary measures for the correction, compensation, or control of the lesions discovered, as far as possible; (2) the detection of non-organic functional disturbances, to be followed by the necessary measures for the correction, compensation, or control of these disturbances, as far as possible; (3) the evaluation and classification of each individual as an entity, to be followed by directions as to suitable future activities and by measures designed to better his classification and thereby improve his well-being and enlarge his potential activities.—G. N. T.

The Principles of Health Supervision in Industry. *B. L. Wyatt. Health News, Oct., 1923, N. S. vol. 18, pp. 238-244.*

Industrial health work must not be a substitute for any fundamental phase or factor of industrial relations, nor a form of philanthropy or paternalism. The fundamental principles in industrial health supervision are:

1. It should be exactly as it is represented.
2. It should embody the spirit of service.
3. It should be developed as the expanding consciousness of the workers enables them to appreciate its benefits.
4. It should include preventive as well as curative measures.
5. It should take into consideration home and community conditions.
6. It should produce results that will justify the operating overhead.—M. F. M.

Health Service for Small Plants. *Nat. Safety News, Nov., 1923, vol. 8, pp. 43-52.*

This is No. 57 of the series of Safe Practices Pamphlets. It discusses the following topics with particular reference to conditions in the small plant: treatment of injuries, treatment of sickness, prevention of sickness, communicable diseases, lunch rooms, drinking water and milk, physical examinations of employees, health education, dental examination, oculist service, employees' benefit associations, supervision of health service, first aid, qualifications of the nurse, qualifications of physicians, location and equipment of dispensary, and securing co-operation of employer and employees.—M. F. M.

Keeping Them on the Job and Fit to Work. *R. W. Elliott. Nat. Safety News, Oct., 1923, vol. 8, pp. 35-36.*

After reviewing the benefits to be derived from various aspects of industrial medicine, the author states that "the task of keeping the man on the job should not be the responsibility of any one man. The safety engineer, the employment manager, the industrial relations department and the medical director compose an executive group directly responsible for all the functions in an industrial establishment not directly concerned with the manufacture and sale of the product."—M. F. M.

Mercantile Health Work. *A. B. Emmons. Health News, Oct., 1923, N. S. vol. 18, pp. 249-253.*

This paper discusses common sanitary defects in department stores, labor turnover, mental hygiene, the extent to which store health services are utilized, and the cost of the service.—M. F. M.

United Fruit Company Health Service. *W. E. Decks. Hosp. Management, Sept., 1923, vol. 16, pp. 66-70.*

This is an interesting account of industrial health work on a large scale. The company has on its payroll approximately 67,000 employees located on its various tropical plan-

tations or engaged in its shipping activities. From a morbidity and economic standpoint, its most important problems are caused by malaria, hookworm, and the venereal diseases. The supply of unskilled labor is constantly shifting and is recruited from regions not subject to sanitary measures. This condition complicates the situation. By vigorous preventive and prophylactic precautions, however, and by providing a very extensive and thoroughly equipped hospital system, the company has been able to keep its average number of employees absent from their duties because of illness or injury down to 1.1 per cent. as against 2.5 per cent. estimated for industrial plants in the United States.—G. N. T.

HEAD INJURIES IN INDUSTRIES. *A. N. Crouch. Indust. Doctor, Sept., 1923, vol. 1, pp. 151-155.*

It is of the utmost importance that the industrial physician should know the signs and symptoms of head injuries, whether they are mild or severe, and what action to take. All cranial injuries are emergencies and call for a rapid systematic examination which is accurate and leads to correct treatment. There is no time to look up literature and read up the case.

In all cases of injury to the head accompanied by cerebral confusion, even if temporary, the patient should be kept under observation for twenty-four hours. During that time there is always the possibility of severe hemorrhage.

The condition of the pulse is probably the most constant diagnostic factor. The rapid fluttering pulse of concussion gradually drops to normal. If it reaches a point of 60 or lower, a definite degree of intracranial pressure is present. If it drops below 50, there is a definite sign of medullary compression.

The problem of how to deal with what the writer terms "compensation neurosis" cases is difficult for the physician, for industry, and for industrial commissions. These cases, in which the patient tends to prolong his period of recovery either through fear or desire for more compensation, are best dealt with by a change in the law. Such a change would provide for a council of three expert neurologists who would render an unbiased opinion which would be final with the patient, compensation commission, and insurance carrier.—G. N. T.

INDUSTRIAL DENTAL SERVICE. *G. H. Hickman. Abstr. as follows from Welfare Work, April, 1923, vol. 4, pp. 63-65, in Jour. Personnel Res., July, 1923, vol. 2, p. 138.*

Reports the need for industrial clinics and the dividends received in the improved health of workers, the saving of time, and the increased efficiency of labor in plants having dental clinics.

Costs and methods of administration are also dealt with.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

PHYSICAL STANDARDS FOR FACTORY EMPLOYMENT. *C. S. Carney. Jour. Personnel Res., Aug.-Sept., 1923, vol. 2, pp. 147-152.*

The writer of this article advocates the adoption of a classification of jobs according to (*a*) eyesight requirements, (*b*) physical requirements, and (*c*) special hazards. Such a classification would facilitate the placement of applicants whom the physician accepts with certain restrictions as to the kinds of work which they may undertake, and would prevent their subsequent transfer to work for which they are not qualified.

The results of physical examinations of 4,000 applicants for employment with the White Motor Company are reported, and typical forms which have proved useful in placing applicants are given.—M. F. M.

EXPERIMENT AND STATISTICS IN THE SELECTION OF EMPLOYEES: METHODS USED IN THE SELECTION OF MACHINE OPERATORS IN A CLOTHING PLANT. *H. A. Wembridge. Abstr. as follows from Quarterly Pub. Am. Statis. Assn., March, 1923, pp. 600-606, in Jour. Personnel Res., Aug.-Sept., 1923, vol. 2, p. 185.*

A statistically reliable criterion of success of factory operatives is available in the plant of the Joseph and Feiss Company where the method of payment is that of piece rates with

bonuses for certain standards of quantity and of quality. Using this criterion it was found that experience in the industry previous to application for employment was no guarantee of production and was practically negligible as a factor in selection. Dexterity and muscular co-ordination as measured by the three-hole tapping test gave zero correlation with the criterion of success. Personal estimates of applicants, made in the employment office with the aid of rating scales, likewise gave zero correlation. But a mental examination modeled upon Army Alpha and Beta gave a positive correlation, r = 0.51, p.e. = 0.029. A scatter diagram of 290 cases shows that if a certain minimum critical score in this mental test had been adopted, forty-eight operators with production below the average of the shop would have been eliminated to every seven with production above the average, and only one really good machine operator would have been lost.

The writer concludes "that the use of mental tests, although only a partial measurement, is the quickest, most accurate and economical method of prophesying future skill at machines and of placing operators at types of work most suited to their capacity; and that a factory where payment is based upon standards which have been carefully established by time studies is peculiarly fitted to measure the value of industrial tests, since industrial success can be determined accurately by standardized productivity, and can be free from personal bias or varying definitions of what success may be."

THE USE OF PERFORMANCE TESTS AND MECHANICAL TESTS IN VOCATIONAL GUIDANCE. *F. Gaw. Jour. Nat. Inst. Indust. Psychol., Oct., 1923, vol. 1, pp. 333-337.*

Most intelligence tests involve the understanding and the use of language, and they often require the person tested to deal with abstract ideas, rather than with concrete, tangible objects. The performance tests employed in the present investigation were non-linguistic, and they dealt largely with concrete objects. They consisted, for instance, of "picture completion" tests, in which the subject has to fill in the holes which have been cut in essential parts of a picture, by selection from a large number of small pictures.

It is certain that an individual's environment does not affect his success on the performance tests as much as on linguistic tests. Canal-boat children, when classified according to their scores on tests involving language, appeared mentally deficient, whereas according to performance tests they were but slightly below normal.

The children examined were likewise subjected to a group of tests of mechanical and constructive ability, for example, assembling mechanical objects such as a bolt and a nut, a hinge, and bicycle bell, or building from a number of wooden blocks and pegs. These tests require mechanical ability rather than general intelligence, such as is needed for performance tests. Hence the correlation between the two tests was found to be somewhat low, namely +0.34.—H. M. V.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

DUTCH LABOR LEGISLATION. *J. G. C. Volmer. Nation's Health, June, 1923, vol. 5, p. 382.*

A brief statement of the regulations in Dutch labor legislation which have to do with the prevention of excessive fatigue.—K. R. D.

WORKMEN'S COMPENSATION ACTS IN THE UNITED STATES: THE MEDICAL ASPECT. *Nat. Indust. Conference Board, Research Rep. No. 61, 1923, pp. 263.*

This report presents in an exhaustive way experience with the medical questions involved in the administration of workmen's compensation laws in this country. The importance of these questions has been emphasized largely by the inclusion of diseases of occupation in later revisions of the laws, and also by the granting of compensation for diseases having only a casual and sometimes remote connection with the occupation or with the original injury. Decisions of industrial boards, of commissions, and of the courts have all been carefully studied and the prin-

ciples and practices developed have been analyzed.

A work of such magnitude necessarily can be reviewed only in a general way. Its scope and thoroughness can best be suggested by the subjects covered in the various chapters. Each chapter contains comparisons of laws and conditions as they exist in the several states with frequent references to specific cases. The titles are: (1) Definition of Employer's Liability; (2) Requirements for Reporting Accidents; (3) Notice of Injury and Claim; (4) Accident Prevention and Safety Education; (5) Waivers; (6) Waiting Period; (7) Personnel of Medical Departments; (8) Medical Fees; (9) Selection of Physician; (10) Medical Service; (11) Medical Examinations; (12) Refusal of Employee to Accept Medical Treatment; (13) Employee's Negligence in Treatment of Injury; (14) Negligence or Malpractice of Physician; (15) Testimony of Physicians—Privileged Communication; (16) Malingering; (17) Permanent Total Disabliity; (18) Permanent Partial Disability; (19) Dismemberment and Loss of Use; (20) Disfigurement; (21) Second Injuries; (22) Autopsy; (23) Disease the Result of Accident; (24) Latent Disease; (25) Infections Resulting from Accident; (26) Eye Injuries; (27) Hernia; and (28) Occupational Disease.

Several points of interest may be noted. In only two states are any persons other than regularly licensed practitioners permitted to treat cases. The custom for certain physicians to specialize in "compensation practice" is growing. The time for supplying medical service to the injured workmen is being extended, and the waiting period before compensation begins, shortened. Compensation for diseases resulting from accident and for the aggravation of diseases latent in the body, as distinguished from diseases due primarily to occupation seems to be increasingly the rule. Commissions and courts are divided as to the responsibility in cases of hernia; in a number of states proof of its occurrence during employment is always placed upon the claimant.

This report emphasizes the fact that medical opinion has not been given the consideration that it deserves in the administration of compensation laws. In only one state is a physician a member of the administrative board. Lack of uniformity in anatomical limitations and descriptive medical terms used is one result.—G. N. T.

Report of the Committee on Estimating Compensation for Eye Injuries. *Jour. Am. Med. Assn., Sept. 29, 1923, vol. 81, pp. 1112-1113.*

This committee of the American Medical Association presents an outline of the research work which it has inaugurated in order to determine various values necessary for establishing a just basis for estimating compensation for eye injuries.—K. R. D.

Medicolegal Importance of Latent Syphilis. *L. Desclaux. Abstr. as follows from Bull. Soc. méd. d. hôp., July 13, 1923, vol. 47, p. 1088, in Jour. Am. Med. Assn., Sept. 29, 1923, vol. 81, p. 1151.*

The spontaneous fracture of the femur while carrying a 50-pound weight on the shoulder was explained by latent syphilis. In a second case, osteitis of the ribs had been ascribed to an industrial accident. It had healed, leaving mediastinitis. Deselaux proved that latent syphilis was responsible for the whole, and was probably antecedent to the accident.—K. R. D.

REHABILITATION OF DISABLED EMPLOYEES

Industrial Physiotherapy. *C. P. Hutchins. Indust. Doctor, Oct., 1923, vol. 1, pp. 174-178.*

After preliminary remarks on workmen's compensation laws as a stimulant to the use of physiotherapy, and on the relation of first-aid treatment to physiotherapy, the author of this paper gives several case reports, some of which illustrate conditions in which the use of physiotherapy has proved effective in restoring function, and others, the necessity for discrimination in its use.—M. F. M.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

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GENERAL

INDUSTRIAL INSPECTION IN GERMANY IN 1921 AND 1922. *Internat. Labour Rev., Nov., 1923, vol. 8, pp. 739-757.*

This article reflects the changes which are taking place socially in Germany; industrial hygiene clearly takes, at present, a second place. References occur throughout to the serious position created by inflated currency. Clearly, regulations intended to safeguard the workers in relation to wages are difficult, if not impossible, to enforce when such rapid alterations are taking place. Food supply is the first requirement with regard to national health, and we find the statement that posts as apprentices for boys and girls leaving school are difficult to find because they are underfed and lack physical strength; here is an indication that the basis of industrial hygiene must first be laid by medical inspection in the schools. Without any special legislation, the eight-hour day has progressively been accepted. The work of inspection has clearly been concerned with giving assistance during the crisis that Germany has been experiencing, and only casual attention to industrial sickness has been possible. There are signs that, during the turmoil, seeds which may develop into a useful harvest of improvement for the workers are being sown—for example, the establishment of works' councils and the increasing extent to which trade unions are interesting themselves in the educational movements.—E. L. C.

PREVENTION OF ILL-HEALTH IN THE COTTON INDUSTRIES OF S. PAULO. *J. R. de O. Netto. Abstr. as follows from Bol. Soc. Med. e Cirurg. de S. Paulo, Brasil, Dec., 1922, Jan., 1923, and Feb., 1923, vol. 5, third series, pp. 181-190, in Tropical Diseases Bulletin, Sanitation Supplement No. 3, 1923.*

This contribution reveals a sad state of things in the cotton works of S. Paulo. The buildings are small, badly constructed, ill-ventilated, dark, overcrowded; the atmosphere is heated, moist, and contaminated by cotton particles, irritating vapors, and poisons in the dyes. The work is arduous;

much of it is done at night. Many women and even children are employed.

The question of ill-health is dealt with as it is likely to arise at each step of the process from the raw material to the finished product—the initial cleaning of the fiber, the spinning of the thread, the dyeing of the finished thread, the raw fiber or the woven piece, the weaving and ironing, the printing and bleaching, the mangling and pressing in a steamy atmosphere, the drying, and the packing.

Ventilation is mainly natural; artificial ventilation is practically restricted to attempts at dust extraction. The heat and moisture cause attacks of convulsions and heat stroke in some, while the majority suffer from fatigue, debility and anemia. The "Vortex" system, an apparatus for automatically regulating the humidity by conducting and spraying cold and filtered water into the air of the room, is recommended. The air is impregnated not only with the dust of the fabric, but with gases and particles of chemicals used in dyeing and other processes—sulphurous, sulphuric, chromic, oxalic, nitric, and even hydrocyanic acid in small amounts. These give rise to headache, vomiting, palpitation, joint pains, and definite local conditions, such as eczema and ulceration, blepharitis and conjunctivitis, laryngitis, bronchitis, and "cotton pneumonia." It is suggested that overalls and masks should be provided, that the drums of dye should be emptied as soon as the operation is over, and that much of the handling of materials should be replaced by machines.

Apart from these conditions the general arrangements are bad; the drinking water is not above suspicion, no cups are provided, and most of the employees drink directly from the taps; the latrines are insufficient and very foul; spitting on the floors is universal. "Shuttle-kissing," with its dangers of tuberculosis and syphilis, is common.

The author quotes the legislative measures in force in other countries—England, France, Germany, Italy, and Austria—and has evidently taken great trouble in preparing a most interesting and instructive paper.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

EXPERIMENTS ON THE EARLY DIAGNOSIS OF INDUSTRIAL MANGANESE POISONING. *L. Schwartz and J. Pagels. Arch. f. Hyg., June, 1923, vol. 92, pp. 77-84.*

The investigations reported in this paper were undertaken with the purpose of discovering, if possible, a clinical laboratory test that would be useful in the early diagnosis of manganese poisoning and applicable to industrial workers; and of determining the relative toxicity of the different manganese oxides.

Thüringer Braunstein (mineral manganese dioxide, a natural pyrolusite), a chemically prepared manganese dioxide (Pyrolusite, Merck), manganoxyduloxyd (Mn_3O_4?), and manganous oxide (MnO) were used in order to determine whether possible differences in degree of toxicity might be explained by variations in solubility or in degree of oxidation.

The different oxides of manganese were fed to cats (in one case, manganese dust was blown into the trachea) for periods varying from approximately two and one-half to eight months. Frequent hemoglobin determinations, red and white counts, and examinations of blood smears were made during the period of feeding.

The authors draw the following conclusions from their work:

"The administration of manganese in our researches on cats caused a primary increase in the hemoglobin content and in the erythrocyte count. In one case, after prolonged administration, a subsequent decrease in hemoglobin content and erythrocyte count occurred. The appearance of paralysis showed the effect on the central nervous system.

"It appears desirable that the medical supervision of workers in Braunstein mills and other manganese works should include periodic hemoglobin determinations and blood counts, and that people with abnormally high or abnormally low blood counts should be watched carefully for clinical symptoms of manganese poisoning in order that they may be taken out of the industry.

"Pure manganese superoxide [dioxide]—

Pyrolusite, Merck—was in our researches more poisonous than Thüringer Braunstein.

"The animals studied varied in susceptibility both to Braunstein and to Pyrolusite.

"The poisonous action of Thüringer Braunstein and of Pyrolusite depends upon their MnO_2 content, the difference in their effects being probably dependent on their different solubilities."—P. D.

EXPERIMENTAL PRODUCTION OF CANCER IN MICE BY PAINTING WITH TAR. *B. Polettini. Pathologica, 1923, vol. 15, p. 337.*

EXPERIMENTAL TAR CANCER. *B. Polettini. Ibid., p. 433. Abstr. as follows in Med. Science, Nov., 1923, vol. 9, p. 165.*

1. Confirmation of the results obtained by previous authors by the same method.

2. A few drops of liquid tar were introduced into the gall-bladder of forty guinea-pigs. In three of them an adenomatous proliferation of the epithelial lining was found after 58, 68, and 88 days, while the gall-bladder was almost entirely filled with a calculous mass consisting of tar and semi-solid bile derivatives.

A DETOXICATED PHOTOGRAPHIC DEVELOPER. *Lancet, July 14, 1923, vol. 205, p. 103.*

The ordinary commercial form of metol as a photographic developer suffers from the drawback of being seriously irritating to the skin. That pure metol is quite innocuous to the skin has been proved by Mr. W. F. A. Herman of the British Dyestuffs Corporation. By adopting a modification in its manufacture, commercial metol free from irritant action can be produced.—M. F. M.

GLAZED POTTERY. *F. Bordas. Abstr. as follows from Ann. d'hyg. publ., indust. et soc., 1923, vol. 1, pp. 181-204, in Zentralbl. f. d. ges. Hyg., Aug. 25, 1923, vol. 4, p. 493.*

The laws of 1791, 1857, and 1912 forbade the manufacture and sale of utensils with a glaze containing lead for use in preparing or storing food. These laws, however, are difficult to enforce because the approved glazes require a very high temperature which impairs the durability of the pottery. An investigation of several factories showed that (1) no lead-free glaze was being used, (2) lead poisoning is very common among workmen, and (3) the glaze frequently is not thoroughly burned into the pottery. The industry as a whole needs investigation and improvement.—A. S. M.

GANGRENE IN LEAD POISONING. *F. Kazda. Abstr. as follows from Wien. klin. Wchnschr., Sept. 27, 1923, vol. 36, p. 694, in Jour. Am. Med. Assn., Dec. 15, 1923, vol. 81, p. 2071.*

Kazda reports three cases of gangrene of the legs in young printers, aged 28 to 46. Although varices are a common occurrence in that trade, there were none in these cases. This confirms his observation that the formation of varices seems to require a good function on the part of the arteries.—K. R. D.

NEW DEVELOPMENTS IN PREVENTION AND TREATMENT OF LEAD POISONING. *W. H. Wood. Indust. Doctor, Sept., 1923, vol. 1, pp. 158-160.*

The author reviews the use of sulphuric acid lemonade, epsom salts, milk and eggs, and potassium iodide in the treatment of lead poisoning. He believes that the absorption of lead is due to formation of lead soaps in the intestine. This is impossible in an alkaline bowel. The proper treatment, therefore, is to increase the alkalinity of the bowel. The author has had most satisfactory results from the administration of potassium citrate. Fatty food should be avoided by lead workers.—A. S. M.

ATMOSPHERIC CONDITIONS AND PHYSIOLOGICAL EFFECTS PRODUCED ON TRAINMEN BY LOCOMOTIVE SMOKE IN THE ASPEN AND WAHSATCH TUNNELS OF THE UNION PACIFIC RAILROAD. *S. P. Kinney. U. S. Bur. Mines, Rep. Investigations, Serial No. 2494.*

This investigation is much like that already reported by Fieldner, Katz, and Kinney (THIS JOUR., 1922-1923, *4*, Abstract Section, p. 188) with the possible exception that the conditions were more severe on the men in the locomotives.

A number of trips were made by the author from which he concluded that (1) asphyxiation due to carbon monoxide and exhaustion due to high temperature and humidity were the chief causes of accidents; (2) asphyxiation or exhaustion might be caused in twenty minutes in cases where engines were stalled in the tunnel; (3) gas masks protect against the smoke and carbon monox-

ide but are impractical because of the temperature and the humidity; (4) air-line respirators delivering air from the train's compressed air line, at atmospheric pressure, proved the best means of furnishing fresh air to the men (this air was comparatively free from carbon monoxide and at a temperature and humidity well below that otherwise breathed in the center of the engine cab); (5) the use of smoke deflectors proved to be a satisfactory method of keeping the atmospheric conditions in the cab in a reasonably safe state.

Tabulated data are given to compare the author's results with those previously reported by him. The proposed air-line respirators are described and illustrated.—P. D.

A New Apparatus Suitable for the Determination of Organic Vapors (Benzene, Benzine) in Gases by the Use of Activated Carbon. *R. Kattwinkel. Abstr. as follows from Brennstoff-Chem., 1923, vol. 4, pp. 179-180, in Chem. Abstr., Nov. 20, 1923, vol. 17, p. 3630.*

The apparatus consists of a metal cylinder 410 by 65 mm. in size, to which is added 100 gm. activated carbon. A measured amount of gas is run through this cylinder and the C_6H_6 or the benzine is absorbed. A connection is made from the bottom of the cylinder to a water-cooled condenser. Superheated steam at 300° is now injected into the cylinder and the absorbed vapors are driven out. The condensate from the cooler is caught in a graduated receiver. The number of cubic centimeters of the C_6H_6 or of the benzine can then be read off.—P. D.

DUST HAZARDS AND THEIR EFFECTS

Methods and Apparatus for the Determination of Dust Suspended in Air. *P. H. Warren and T. A. Read. Proc. Australian Inst. Min. and Met., New Series, 1922, No. 47, p. 297.*

The following letter is a reply to an abstract which appeared in This Journal, Aug., 1923, 5, pp. 83-84.

Broken Hill (Australia) 3rd November 1923.

The Editor,
Journal of Industrial Hygiene,
Boston 17, Mass.

Dear Sir,

The Journal of Industrial Hygiene, August 1923, contains a review of our paper "Methods and Apparatus for the Determination of Dust Suspended in Air." The September, 1923, issue of the above journal also contains a reference to the subject matter of our paper in an article entitled "Atmospheric Particulate Matter: II. The Use of Electric Precipitation for Quantitative Determinations and Microscopy" contributed by Philip Drinker, Robert Thomson, and Seth Fitchet. The following statement is made in the above mentioned review:

> In the authors' laboratory work one is impressed by the fact that no mention is made of the size of particles entering the apparatus while in the careful review which precedes the description they lay great emphasis on the significance, from the physiological standpoint in particular, of particle size. In the writer's opinion the authors' laboratory test is by no means as severe as that used by the Bureau of Mines, whose figures on the efficiency of the sugar tube filter are cited by the authors as a basis for comparison with the 95 per cent. efficiency which they obtained with silica dust. From the principle on which the new apparatus operates it seems that the size and character of the particles would have an important effect on the readiness with which the particles could be wetted.

In the opening pages of our paper the question of the size of dust particles produced in mining operations was discussed in detail, in order that the nature of the material to be dealt with might be understood. In the paper (Proc. Australian Inst. Min. and Met., New Series, 1922, No. 47) on page 301, the statement is made:

> A study of the foregoing extracts seems to show that the greater proportion of dust that it is the aim to suppress, is extremely small, and also leads to an arbitrary classification of mine dust into—injurious dust particles 5 microns in diameter or under, and non-injurious dust particles over 5 microns in diameter.

In the description of methods employed to count konimeter samples, it was also shown that classification of particles above and below 5 microns diameter was used.

Very many samples of dust obtained in the

routine operations of mining in this and other fields have been microscopically examined, and although some operations will produce larger particles than others, at least 90 per cent. of the particles produced in all operations are found to be below 5 microns in size. It is regarded as axiomatic that the operations of modern mining are such that in typical ore bodies where rock drills are used for boring holes, dust particles, the bulk of which are below 5 microns in size, are inevitably produced. The results of any samples, therefore, given in our paper, were all obtained from air containing the above-mentioned range of particle size.

The laboratory test which we employed for finding the efficiency of the Read water spray sampler was not as elaborate as that used by the Bureau of Mines, as we did not use any light reflection means such as the Tyndall beam for estimating the percentage recovery of original dust in the air, but confined our attention to estimating the efficiency of the apparatus on a weight basis. We think that in this form of test it is desirable to keep the quantity of apparatus and the number of operations as small as possible. The only true measure of the efficiency of a gravimetric sampling apparatus is the proportion of dust by weight collected by it, compared to the weight contained in the air which is being sampled.

Great care was taken to guard against the entry of foreign dust into the sample, and the use of prepared silica dust provided satisfactory dust clouds. It should not be forgotten, too, that the laboratory test was supplemented by a series of fourteen pairs of samples taken under working conditions. In these tests the water spray sampler was tested against sugar tubes made to the Bureau of Mines standard dimensions. Each pair of samples was obtained by running two sampling units simultaneously for the same period of time. The arithmetic average for the water spray was 6.68, and the sugar tubes 6.78 mg. per cubic meter. It seems apparent from these figures that the respective efficiencies of the two apparatus have a close relationship.

Referring to the reviewer's statement in connection with the readiness with which the dust particles would become wetted according to their size and character, we claim that the principle on which the Read water spray sampler works is such that each particle of dust entering the apparatus is surrounded by an envelope of water as a result of the air stream's meeting the water stream at a high velocity; the consequent drop in pressure and expansion of air causes a condensation of water upon the individual dust particles, which are projected against the smooth surface of the inner scrubbing chamber, and may then slide down to the water reservoir at the bottom. The air contained in the inner scrubbing chamber must also receive a further scrubbing as it passes below the baffle plate to the outer chamber. The water is intensely atomized, but the quantity lost is only sufficient to saturate the incoming air. On page 323 of the paper the quantity is given as 0.003 c.c. per minute for a relatively dry atmosphere. This low loss of water should be some indication of the efficiency of the apparatus.

The size of the dust particles should have no bearing upon the efficiency of this apparatus, but the degree to which the dust will become wetted may be affected by other physical and chemical properties of the dust, in which case some collecting medium other than water should be used. This matter was mentioned in the paper, page 321, in some detail.

The August review also contains the following statement:

> It is surprising that electrostatic precipitation is rated at only 82.7 per cent. efficient. The figure is taken from Bill (THIS JOUR., 1919-1920, *1*, 323) and no mention is made of the mass of industrial data published by others (references follow) all of which show that efficiencies of 95 to 100 per cent. can be obtained from such substances as smoke, ammonium chloride fume, and dust.

Further reference is made to the same point in the September issue of the Journal of Industrial Hygiene (p. 178).

The basis of comparing the efficiencies of different methods of dust collection adopted by us was that of the percentage recovery of the original dust in the air when reduced by laboratory treatment to a condition enabling chemical analysis to be conducted if required. This point, when dealing with toxic dust such as that derived from lead ores, may become very important.

The efficiency figure of 82.3 per cent. (not 82.7 per cent.) given against Bill's method of

electrostatic precipitation was taken from his own article, Journal of Industrial Hygiene, November, 1919, *1*, page 340, and reads as follows:

> As a result of experiments in Table III, 96.1 per cent. of artificial dust charges were retained. If in the subsequent processing the dried total sediment represents 85.7 per cent. of the dust caught on the precipitator, and we assume the efficiency of the high-tension machine, based on Table III, to be 96.1 per cent., then the total sediment obtained by evaporation, on the basis of this comparison, represents 82.3 per cent. of the dust in the original air sample.

We have not intentionally treated Bill or the electrostatic method unjustly. The method, apart from the possibilities of loss in laboratory treatment, is capable of a high efficiency. Here, however, as in South Africa, it has been necessary to discuss the problem from the point of view of the practical application of dust determination methods in mines. In the awkward and relatively inaccessible working places of mines, vexatious working difficulties are continually encountered. Apparatus, therefore, which is light, strong, quickly set up, and reasonably efficient, becomes a prime necessity in routine work. No method, even though 100 per cent. efficient, involving the necessity of preliminary wiring of the place to be sampled, or the use of cumbersome apparatus, is of practical utility for routine work in such places.

Yours faithfully,

P. H. WARREN
T. A. READ

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

ANTHRAX AND ITS TREATMENT. *H. E. Santee. Ann. Surg., Sept., 1923, vol. 78, pp. 326-331.*

This article is summarized as follows:

Thirty-seven cases of anthrax are reviewed.

This disease tends toward a septicemia from the local lesion.

Specific serum offers a very fair prognosis. Its use should be intensive, both intravenous and local, at the outset.

Surgery has no place in the treatment of the lesion. Its use may be directly harmful.

METHODS OF DETECTING TUBERCULOSIS IN WORKERS OVER THE AGE OF SIXTEEN. *J. A. Raeburn. Jour. Roy. San. Inst., Sept., 1923, vol. 44, pp. 95-100.*

The author points out that care taken to detect cases of tuberculosis during the years of infancy and during the school age ceases when the adolescent becomes industrially employed. He puts forward a strong plea that large employers of labor should arrange to have their workers examined periodically. Dr. T. Readman pressed the matter when discussing the paper, and pointed out that periodic examination would also be of great value in detecting other diseases—for instance, pyorrhea—as well as tuberculosis.—E. L. C.

EMPLOYMENT FOR THE TUBERCULOUS. *J. B. Deacon. New York Tuberculosis Association Bulletin, Nov.-Dec., 1923, vol. 4, pp. 1, 10-12.*

The difficulties encountered in finding proper work for the tuberculous person who must return to industry after treatment are those that usually surround the placement of unskilled workers complicated by the fact that about half the tuberculous are candidates for jobs that involve a minimum of physical and nervous wear and tear. Pre-industrial training courses in sanatoria, competent, continuous medical supervision and sheltered work for patients when they return to industry, vocational retraining for those who are potentially capable of productive work under normal working conditions but whose former occupations were hazardous to health, and employment at jobs in regular industries for quiescent and arrested cases are suggested as aids in restoring the tuberculous worker to a proper place in industry.—M. F. M.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

FATIGUE OF THE VISUAL APPARATUS IN MINERS. *M. Stassen. Rev. d'hyg., Sept., 1923, vol. 45, pp. 769-788.*

The cause of eyesight troubles, including nystagmus, among miners is long hours of work by insufficient light in the depths of the mine. Improvement in lighting conditions lessens and may even completely overcome ocular fatigue in miners. This is not only the conclusion of the writer but is the opinion reached in an official inquiry which the British Government undertook after the war in the English and Scotch mines (First Report of the Miners' Nystagmus Committee. Med. Research Council, Special Report Series No. 65, London, 1922).

As a consequence of the work of English and French investigators the following conclusion becomes clear: In order to combat nystagmus and, in a general way, the pathological symptoms due to fatigue of the visual apparatus observed among miners, it is necessary to increase more and more the lighting power of the safety lamps and to require even more light in the depth of the mine.—G. N. T.

PENETRATING INJURIES TO THE EYE IN INDUSTRIAL OPERATIONS. *F. Allport. Illinois Med. Jour., Oct., 1923, vol. 44, pp. 283-288.*

"The subject of foreign bodies inside the eyeball practically resolves itself into a consideration of steel or iron particles. Fortunately, such particles are removable with the magnet, with the single exception of manganese iron fragments, and these are rare."

The author is not in agreement with Haab and others who believe that practically all foreign bodies should be removed through the cornea. In his opinion, it is possible for an expert to carry out Haab's procedure without injury to the eye, if the object is small and smooth, but impossible for even an expert if the object is large and sharp. The author's rule is to use the corneal, or anterior, route only when the foreign body is in or anterior to the lens. All other particles should be withdrawn through the posterior, or scleral, route. He believes, however, that it is wise to remove all intra-ocular foreign bodies, wherever located, as soon as possible, provided this can be done without almost irretrievable disaster to the eye. Some surgeons disagree with him in this respect, maintaining that if the foreign body is in the lens it should be left alone, as the lens has no sensory nerves, and therefore the case is practically safe.

Allport describes briefly his procedure in cases where the foreign body is in or anterior to the lens, and gives in detail the method which he uses in removing foreign bodies from the posterior chamber. He emphasizes the importance of testing the magnet from time to time in order to make sure that it is working. A brief discussion of the types of magnets suitable for this work concludes the article.—M. C. S.

INDUSTRIAL SURGERY

NITROUS OXID ANESTHESIA IN INDUSTRIAL SURGERY. *H. G. McNeil. Cal. State Jour. Med., Sept., 1923, vol. 21, pp. 376-377.*

Industrial surgery is an exacting specialty and should make use of all appliances that will assist in the prompt and painless recovery of injured employees. On the success of the treatment given depends the future earning capacity of the patient. The latter is sensitive and critical. Introductory work should be done with care and gentleness in order to establish confidence, and subsequent attention should be as painless as possible.

Nitrous oxide gas furnishes a harmless method of relief from pain during the treatment of painful injuries and the application of dressings. It is not so toxic as either chloroform or ether, and the signs of asphyxia are plain and distinct. Machines in use for administering it are simple and accurate. The use of such gas is really a necessity in fracture work. The patient is usually awake and able to go to the X-ray room by the time reduction is made and dressings applied. Then the plates can be viewed in a few minutes and if the results are not satisfactory the process can be repeated until a satisfactory reduction is made. Gas is equally useful in the shifting

of splints, the movement of ankylosed joints, the dressing of extensive burns, and in drainage. The expense is not great, material costs being about $1.25 per hour.

At present nitrous oxide gas is not being used as extensively in industrial work as its merits justify.—G. N. T.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

II. Effect of Vigorous Exercise on Size of Normal and Abnormal Heart. *B. Gordon and G. F. Strong. Abstr. as follows from Arch. Int. Med., Oct., 1923, vol. 32, p. 517, in Jour. Am. Med. Assn., Dec. 8, 1923, vol. 81, p. 1982.*

Normal rabbits were exercised by Gordon and Strong to complete physical exhaustion. The result in every instance was a definite decrease in the size of the heart. Six animals in which experimental myocarditis had been produced responded to overexertion in a similar manner. Although the rabbits had been observed for only a comparatively short time, there was no evidence that acute overexertion influenced the general condition of the animals.—K. R. D.

The Vital Capacity of the Chinese: An Occupational Study. *J. H. Foster and P. L. Hsieh. Arch. Int. Med., Sept., 1923, vol. 32, pp. 335-342.*

This article is summarized as follows:

1. The vital capacity in 500 Chinese in eleven occupational groups, including a number of young women, has been studied and analyzed.

2. A normal standard of 2 liters per square meter of body surface for men and 1.5 for women was obtained.

3. A normal standard of 19 c.c. per centimeter of body height for men and 14 for women may also be used with little less accuracy.

4. Various factors were noted which affect the vital capacity: (a) Men show a vital capacity 31 per cent. greater than women. (*b*) Occupations seem to influence the vital capacity to some extent, although not in proportion to the degree of physical activity. (*c*) Athletics tend to increase the vital capacity.

As a result of these findings, the authors conclude that the Chinese show much lower vital capacity ratios than Westerners, and that standards based on a picked group of persons cannot be applied uniformly to all groups.

WOMEN AND CHILDREN IN INDUSTRY

Child Labor on Maryland Truck Farms. *A. Channing. U. S. Dept. Labor, Children's Bur., Pub. No. 123, pp. 52.*

This study is one of a series being made by the Children's Bureau dealing with the problem of child labor in rural districts.

A large proportion of the children who live in truck-farming areas on the Eastern Shore and in Anne Arundel County work on the farms. Of 774 children under the age of 16 enrolled in the schools of the Eastern Shore areas included in the survey and reporting on the inquiry, nine-tenths had done farm work during the year preceding the study, which was made in May, June, and July, 1921. In the Eastern Shore localities the workers are largely farmers' children; in the Anne Arundel area there are, in addition to farmers' children who work, large numbers of hired laborers, either negro children living in the area or white children who migrate from Baltimore for seasonal farm work.

Most children, both white and negro, under 10 years of age work a short day at simple kinds of work and for only a few days during the year; they present no serious problem. Most white girls do little more work than the young children, but some of the older negro girls and a large proportion of white and negro boys 12 years of age or more, especially those in farmers' families, were employed for nine and ten hours a day at tasks demanding skill and strength.

J. I. H.
Feb., 1924

A majority of the children suffered loss of schooling as a result of their work on the farms. Nearly one-fifth of the white children had been absent thirty or more days during the preceding school year.

One-third of the child workers on farms in the Anne Arundel area were migratory workers. They present serious problems in connection with schooling and with living conditions on the farms where they live during the picking season. They lose from four to six weeks at the end of the school term to go to farms where housing accommodations are so unsatisfactory as to call for public supervision.

The only regulation of the work of children on farms in Maryland is the indirect restriction imposed by the state compulsory education law, which, however, is not adequately enforced. The child labor law applies only to a specific list of occupations which does not include agriculture.—M. F. M.

WOMEN'S LABOUR IN BENGAL INDUSTRIES. *D. F. Curjel. Abstr. as follows from Bulletins of Indian Industries and Labour, Calcutta, June, 1923, No. 31, pp. 40, in Tropical Diseases Bulletin, Sanitation Supplement No. 3, 1923.*

A descriptive account of the circumstances and conditions of female labor in the jute and cotton mills near Calcutta, in the tea gardens of the Dooars and Darjeeling area, and the Raniganj coal mines.

The paper contains much interesting matter, but the arrangement of the subject is defective, and it is very difficult for the reader to ascertain what remedial measures the writer suggests.—E. L. C.

WOMEN IN SOUTH CAROLINA INDUSTRIES. *U. S. Dept. Labor, Women's Bur., Bull. No. 32, 1923, pp. 127.*

This survey of women in South Carolina industries gives data on hours, wages, and working conditions in November and December, 1921. It covers 10,328 white women, 843 negro women, and 590 white girls under 16 years of age, employed in 151 establishments located in fifty-six industrial communities. They constituted about one-half the women workers in the important women-employing industries in the state.

The scheduled weekly hours were in the majority of cases less than the legal sixty-hour week. (This has been reduced to fifty-five hours since the study was made.) Nevertheless, three-fourths of the women were working under schedules sufficiently long to be a strain on health. A few women received wages that compare favorably with the minimum wage rates set by law in certain states, but the bulk of them received wages that were considerably lower. Working conditions in some establishments were good and were startlingly bad in only a few; but in the majority of cases much is still to be done before desirable standards are attained.—M. F. M.

PHYSICAL PROTECTION OF WOMEN WORKERS. *K. Hauck. Abstr. as follows from Mitt. d. Volksgsndhtsamtes. Jg., 1923, pp. 77-80, in Zentralbl. f. d. ges. Hyg., Oct. 25, 1923, vol. 5, p. 238.*

Detailed, practical statistics are necessary as a first step in the effective protection of the health of working women. In Austria detailed accident insurance forms have been drawn up, and in most cases they are conscientiously filled out. The material is collected by the official industrial inspectors, and is intelligently worked up. All this is lacking, however, in the case of sickness insurance. Sickness insurance forms have no headings which would give information as to civil status, number of children, profession, kind of occupation, etc. In addition, the forms are inaccurately filled out. They are worked up by the individual sickness insurance companies only, which means by a personnel inadequately trained for such work, and consequently do not yield sufficient material for legislative action for the physical protection of women workers.—C. E.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

THE "MAKE-UP" *of the* ENGINEERING WORKER. *M. Tagg. Jour. Nat. Inst. Indust. Psychol., Oct., 1923, vol. 1, pp. 313-324.*

As the result of considerable practical ex-

perience, the writer concludes that the success of women in repetition work varies inversely with intelligence, because intellectuals try to bring judgment into play where no judgment is required, and from the temperamental point of view the deadly monotony of the work is killing to intelligent persons.

The writer has graded a large number of engineering trades according to the degree of general intelligence required. He divides them into five classes, designers in the drawing office coming at the head of the scale and unskilled automatic machine workers at the foot of it. He considers that the chief abilities required by most of the engineering trades are: (*a*) perception of space and form, (*b*) memory of form and size, (*c*) motor ability, (*d*) attention, (*e*) creative imagination, and (*f*) accuracy of detail.

Temperament plays as great a part in success or non-success in industrial life as does ability. For instance, tool-room workers require all the best temperamental qualities, such as patience, method, initiative, concentration, and capacity for co-operation with drawing office, foundry, and machine shop. On the other hand, it is economically unsound and socially demoralizing to put workers of considerable intelligence on to semi-skilled and unskilled work.—H. M. V.

Scale Cage in Motion Study for Finding the Factor of the One Best Way to Do Work. *F. B. Gilbreth and L. M. Gilbreth. Jour. Personnel Res., June, 1923, vol. 2, pp. 65-69.*

This article describes a new micromotion study device and method for measuring the third dimension in non-stereoscopic as well as stereoscopic photographic records of motion and behavior. The scale cage, made of 1 inch square material, is 6 feet long, 3 feet wide, and 3 feet high. It is hinged for folding into a bundle of parallel sticks when not in use. After the pictures which include the scale cage are taken, they can be projected on a screen made of cross-sectioned paper which will permit having the cross sectioned lines of the screen coincide at any point desired with the scale markings on the scale cage, according to the distance and angle that the screen on which the pictures are projected is held to the line of light projected. Pictures of the motions of bricklayers, berry pickers, and other workers have thus been made which record accurately linear measurement and scale in perspective without special and intricate preparation. The actual use of the cage is best understood from the photographs accompanying the article. The authors have found that by analyzing the results of such micromotion studies of human behavior it is possible not only to increase greatly the efficiency of operation, through the elimination of ill-directed and unnecessary motions, but also to avoid the unnecessary fatigue resulting from such motions. —G. N. T.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

An Unusual Insurance Home. *Nation's Health, Oct., 1923, vol. 5, pp. 722-724.*

In this article is described the manner in which the Maryland Casualty Company cares for the welfare and health of its employees at the home office in Baltimore. Every applicant for work is carefully examined by the company physician. An effort is made to place employees in positions which are as nearly as possible in accord with their preferences and fitness. Each employee is periodically rated in seven specific qualities by two or more supervisors to whom his ability and fitness for the position that he holds are best known. Absentees for minor disabilities are visited in their homes by visiting nurses. Major cases are sent to the central clinic. A disability allowance is provided for all employees according to length of service. There is an employees' club house with library, girls' lounge, men's smoker, auditorium, cafeteria and club store.—L. A. S.

$1.80 Monthly per Capita for Health. *H. S. McCauley. Hosp. Management, Nov., 1923, vol. 16, pp. 74-76.*

The Yellow Taxi Cab Company of Chicago regards its medical, welfare, educational, and recreational activities as vital factors in increasing business earnings. It supports two well-equipped medical offices and has made arrangements with physicians and hospitals in

all sections of the city to provide medical treatment for employees and passengers when they cannot be brought to one of its own offices.

Its welfare workers try to relieve employees of worries which intrude upon working hours and lessen efficiency. Sickness is provided for by a benefit association. Membership in this organization costs 25 cents a week during the first year of employment and 10 cents a week thereafter. Free insurance is also provided.

All drivers must take a course in the art of driving and must pass a rigid examination before they are entrusted with a cab. The traffic rules which the company requires them to observe are more stringent than the municipal regulations.

The company has 5,850 employees and spends $126,360 a year, or an average of $1.80 per month per employee, for welfare work.—M. F. M.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

New York State Labor Law with Amendments, Additions and Annotations to August 1, 1923.

New York State Miscellaneous Labor Laws with Amendments, Additions and Annotations to August 1, 1923.

The first of these pamphlets contains the Labor Law and certain sections of the Penal Law pertinent thereto; the second, provisions of the laws of New York, other than the Labor Law and the Workmen's Compensation Law, which directly or indirectly affect labor.—M. F. M.

New York State Workmen's Compensation Law with Amendments, Additions and Annotations to August 1, 1923.

Court Decisions on Workmen's Compensation Law, July, 1921-April, 1923: Constitutionality and Coverage. New York State Dept. Labor, Special Bull. 118, June, 1923.

The first of these pamphlets contains the Workmen's Compensation Law of New York; the second, court decisions on constitutionality and coverage.—M. F. M.

Work-Accidents in Oregon. *Industrial Accident Commission, pp. 40.*

This pamphlet gives a brief explanation of the Oregon Workmen's Compensation Law and its operation.—M. F. M.

Workers' Compensation in Cases of Lead Poisoning. *Internat. Labour Rev., Oct., 1923, vol. 8, pp. 590-591.*

This article summarizes three papers on the provisions of the French law relating to occupations which were presented at the Eighth Congress of Forensic Medicine in French-speaking Countries held in Paris in May, 1923. The law is criticized on the ground that the principle of presumption of the origin of the disease leads to compensation in cases, for example, of nephritis, in which the disease is not due to lead poisoning, while, on the other hand, it provides no compensation for indubitable effects of lead poisoning, such as encephalopathy.—M. F. M.

REHABILITATION OF DISABLED EMPLOYEES

The Physiotherapy Treatment of Industrial Accident Cases. *J. R. Kerr. Jour. State Med., Oct., 1923, vol. 31, pp. 467-470.*

The author of this paper discusses some of the physical conditions resulting from industrial accidents which respond to physiotherapeutic treatment. Physiotherapy applied at the earliest possible date after an injury hastens restoration of function.—M. F. M.

A Hundred Cardiacs at Work. *G. R. Stein. Nation's Health, Oct., 1923, vol. 5, pp. 701, 702, 761, 762.*

The conclusions arrived at in this article are based upon 100 cardiac cases which have been under observation for a little less than a year by the New York Bureau of Rehabilitation and its agents. Tables suggesting occupations for cardiacs are given.

The complexity of the problem of placing the cardiac makes it difficult to draw conclusions from this very brief study. The following general statements, however, may be made.

1. It is possible for many cardiacs to work; in fact they are better at work than when idle.

2. The rehabilitation of cardiacs is a difficult process. A specialized vocational advisement bureau should act in co-operation with heart specialists.

3. Great flexibility in the methods of rehabilitation is essential.

4. The potential working ability of the cardiac must first be tested out in a subsidized workshop before actual placement is undertaken.

5. Employers must be made to understand that cardiacs may be useful workers if the employment does not exceed their physical strength.—L. A. S.

Village Settlements for the Consumptive. *P. C. Varrier-Jones and C. Allbutt. Lancet, Oct. 20, 1923, vol. 225, pp. 912-914.*

The authors protest strongly against the idea that anyone, least of all a convalescent consumptive, can be fitted by some system of intensive, short period training to take his place in the world in competition with the fully trained and experienced healthy man. Except in the few cases where recovery is so complete that the patient can be returned to his own occupation, the village settlement where he is safeguarded and is outside the run of industrial competition is the only tried alternative. Facts have been amassed at the Papworth Village Settlement to prove that the consumptive can earn a wage sufficient, together with a small subsidy, to provide the necessaries of life for himself and his family. The scheme, however, is intricate and calls for knowledge of industry and commerce to insure success. The article is intended to show that the notion of a rapid intensive training for the consumptive is an economic failure and a harmful fallacy.—E. L. C.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

An Inquiry into the Mortality of Coal and Metalliferous Miners in England and Wales. *E. L. Collis. Proc. Roy. Soc. Med., 1923, vol. 16, pp. 85-101.*

This paper, while it deals particularly with different branches of mining and carries forward the article by the same author which appeared in This Journal (1922-1923, vol. 4, Nos. 6 and 7, Art. Sec., pp. 256, 307) is in effect a summary of much of his work on the pneumonokonioses. It presents a statistical basis for further laboratory research. Data from various sources, but mainly from the last three occupational supplements of the Registrar-General, are analyzed. The mortality rates among men employed in getting (*a*) coal, (*b*) tin, (*c*) lead, (*d*) ganister, (*e*) hematite and ironstone, and (*f*) slate are reviewed, and the mortality rates in other occupations—*e.g.*, boilermaking, stone dressing, and metal grinding—are cited to supply collateral evidence. Special consideration is given to the occurrence of phthisis, and reasons are found for holding that the form of this disease which occurs among miners is the same whether the incidence is low among coal miners or excessive among tin miners. This form is claimed to be associated with the inhalation of dust of silica, oxide of iron and alumina, although only the first named is associated with an excessive phthisis mortality; and the suggestion is put forward that the chemical property possessed by these three compounds of forming positive colloids may determine the way in which they react upon the tissues of the body.

A method of statistical differential diagnosis is employed in which the occurrence of high mortalities from certain other causes of death is used to distinguish one statistical type of phthisis from another.

Data are also given for the occurrence of cancer distributed according to the part affected, but this line of inquiry has proved negative, since no mining group was found with a high incidence of cancer either as a whole or according to the part affected. Coal miners do not exhibit any tendency to suffer from epitheliomata as do persons exposed to coal-tar products, *e.g.*, chimney-sweeps and pitch workers.

J. I. H.
Feb., 1924

ABSTRACT OF THE LITERATURE

OF

INDUSTRIAL HYGIENE

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GENERAL

THE PRESENT STATUS OF SANITATION IN THE FELT HAT INDUSTRY IN THE PROVINCE OF PODOLSK, GOVERNMENT OF MOSCOW. *A. Smirnov. Hygiene of Labor, 1923, No. 5-6, p. 79.*

The felt hat industry which has almost died out during the past ten years is rapidly reviving now, and the problem of protecting the health of the hatter and especially of eliminating the use of mercury in the hat industry is seriously confronting the sanitary authorities.

In Russia, the process of soaking the squirrel and rabbit skins with a solution of mercuric nitrate is done by cutters (who separate the fur from the skin) in their homes, and the fumes of the nitric acid constantly fill the dwellings and are inhaled by all members of the family. Next, when the skins are heated in the oven the mercury vapors escape into the rooms and at cooling settle on the walls and often on the food, causing mercurial poisoning. The dwellings become so filled with obnoxious gases that, according to the workers, the young animals, which usually occupy the same quarters with the family, especially sheep and calves, have to be led out of the building until this process of treating the skins with the mercury is over. Later when the felt is rolled and shaped the mercury vapors again fill the air, as has been demonstrated by numerous tests.

It is an established fact that the hatters and their families suffer seriously from the effects of the mercury, which causes various intestinal diseases, chronic pulmonary affections, tuberculosis, general anemia, and nervous and mental disturbances.

In 1903 Dr. V. A. Levitsky was delegated abroad to study the methods of eliminating the harmful conditions in the hat industry. After his recommendations the Moscow Government Zemstvo undertook a campaign for the elimination of mercury and for the introduction of the Jourde-Lussigny method in which an 8 per cent. Bé. solution of potassium hydroxide or caustic potash is used. In the same year, under the supervision of Dr. Levitsky, a factory was opened as an experiment, for the purpose of making felt hats with the use of potassium hydroxide. The experiment proved successful and a campaign was started to induce the hat manufacturers to abolish the use of mercury in favor of the new method. At the local hospital a small laboratory was established for the production of potassium hydroxide from potash and calcium (lime). But seeing the conservatism and lack of support from the manufacturers, a group of organized hatters took over the factory and soon found a ready market for the hat produced by the new method.

In order to prove the value and merits of the new method and the advisability of adopting it, the Moscow Government Zemstvo called an official commission of experts from the largest hat factories and asked them to select from a number of hats (some of which had been manufactured by the new process, and some by the old) those which, in their opinion, contained the higher quality of fur. All hats recognized as superior were made by the new method without the use of mercury.

After this experiment two large hat factories introduced the new method at the initiative of their owners. It was further demonstrated that the felt made from the fur separated by the aid of potassium hydroxide is lighter, and more silky, and takes the fine shades of dyes much better than does the felt prepared with mercury. Some felts, such as "snow-white," can be obtained only with the use of potassium hydroxide.

Unfortunately, as in every other new movement, there was much opposition to be overcome and, with the change of the members in the Zemstvo and withdrawal of their support, the workers' factory closed after four years of existence. The new method took root, however, and many of the manufacturers who opposed the new method for various reasons—such as the difficulty in obtaining potassium hydroxide, the lack of large buildings for drying the skins in the air instead of in the oven, the difficulty in shaping the hats, the inferior quality of the goods, irritation of the respiratory organs of the workers caused by the dust from the fur—all later changed their attitude because of the indisputably superior quality of felt produced by the new method.

As a means of convincing hat manufacturers of the merits of the new method the Moscow Government Zemstvo canvassed the biggest firms of Moscow and Petrograd buying felt hats. Thirteen of them testified to the higher quality of the felt hats made by the potassium hydroxide method. The results of this canvass were published by the Moscow Government Zemstvo in pamphlet form and sent out to all hat makers. At the Dresden Hygiene Exhibit in 1911 samples of these felt hats were shown, and a model factory was demonstrated. In the pamphlets distributed at the exhibit, the hope was expressed that material advantages would sooner or later bring the manufacturers to adopt the potassium hydroxide method and to abolish the use of mercury forever.

With the revival of the hat industry in 1922 the Department of Textile Unions instituted court proceedings against the hat manufacturers using mercury, and heavy fines were imposed. In a survey made a few months later, however, it was revealed that the use of mercury was not abolished, but continued underground instead of in the open. Therefore, the Scientific Advisory Council of the Moscow Labor Board, after studying all phases of the question, made the following recommendations:

1. The issuance of compulsory regulations prohibiting the use of mercury will not remedy the situation and should be considered untimely for the present. Such a measure will drive the use of mercury underground and will only increase the difficulty of fighting this evil.

2. It is suggested that a conference of representatives from all local branches of the Department for the Protection of Labor be called in order to consider the possibility of eliminating the use of mercury from the felt hat industry and to work out a project of compulsory measures to be enacted for the protection of the workers' health in this industry.

J. I. H.
March, 1924

The following references are mentioned in the article:

Levitsky, V. A.: The Collision between Public Health and Capitalism. Public Health (Obshtshestveni Vrach) No. 2, 1908.

Levitsky, V. A.: Sanitation in the Hat Industry in the Province of Podolsk, Moscow. Medical Reports of the Moscow Govt. Zemstvo (Trudi Vrachei Moscovsk, Gubern Zemstva), 1923.

Manufacturing Felt Hats in Russia without the Use of Mercury. International Hygiene Exhibit, Dresden, 1911, Publication of the Moscow Govt. Zemstvo.—R. B. R.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

COPPER AS A CONSTITUENT IN WOMAN'S AND COW'S MILK. ITS ABSORPTION AND EXCRETION BY INFANT. *A. F. Hess, G. C. Supplee, and B. Bellis. Abstr. as follows from Jour. Biol. Chem., Oct., 1923, vol. 57, p. 725, in Jour. Am. Med. Assn., Dec. 8, 1923, vol. 81, p. 1983.*

Investigations made by Hess, Supplee and Bellis show that cow's milk and woman's milk regularly contain copper, and that in infants and adults copper is absorbed from the alimentary tract; this was proved by its constant presence in the urine.—K. R. D.

THE EXPERIMENTAL INQUIRY INTO THE CAUSES OF CANCER. *A. Leitch. Brit. Med. Jour., July 7, 1923, vol. 2, pp. 1-7.*

This article is a detailed review of what has been done in cancer research during the last few years, especially in the experimental production of cancer by the use of various irritants or "carcinogenic agents," the latter being substances which are more or less extensively used in industry. It has been known for more than a century that certain irritants, if they can exert their effect over a long period, are capable of setting up cancerous growths, such as the scrotal cancer of chimney sweeps attributed to soot, the epithelioma of tar, pitch, and paraffin workers, and, more recently, the bladder cancer of aniline dye makers and the epithelioma of X-ray operators. Many questions, however, remained unsolved, such as, why so few of those exposed to these irritants have developed tumors; why in some instances the latter have developed after the exposure has ceased for some time; and why these so-called irritation cancers should form so small a proportion of all the malignant growths that occur in human beings. The commonly accepted theory was that the carcinogenic agents brought about a pathological state of the tissues which prepared the soil for the undetermined cancer germ, or virus, or "influence."

A new era dawned on cancer research when Fibiger of Copenhagen published his brilliant experiments in the production of gastric carcinoma in rats—experiments which were suggested by the accidental discovery in the stomachs of three rats of epitheliomatous growths containing in their center an unknown nematode. He succeeded in running down the particular nematode in the bodies of cockroaches which had come over from America in a sugar cargo. He fed them to rats and produced experimental gastric cancer in over 50 per cent. The larva burrows into the gastric epithelium and there develops to maturity. There may be no change in the mucosa or there may be a proliferation of the epithelium, formation of papillomata, and then a growth downward into the muscular coats and the peritoneal covering. Metastases occurred in several cases, in the lungs or lymphatic glands, but the parasites were absent from these secondary growths.

Fibiger's work received confirmation in 1920 when Bullock and Rohdenburg announced that they had successfully produced spindle-celled sarcoma in young rats by feeding to them on one occasion a large number of ova of Taenia crassicollis, which they had obtained from the feces of an infected cat. In the majority of the younger rats the larvae reached the liver, formed cysts, and in about a quarter of these cysts sarcoma developed in the wall. Metastases occurred in about 60 per cent. of the cases. There is a long latent period in the development of these liver sarcomata, eight to fifteen months, but once the growth is started, it progresses rapidly. Leitch says that this peculiar feature has been noted also in the experimental production of

sarcoma by paraffin oils and by tar.

The first successful experiments with tar were made by two Japanese workers, Yamagiwa and Ichikawa, who produced epithelioma by applying coal tar every other day for several months to the ears of rabbits. Tsutsui had even better success, for he discovered that the mouse was the animal of choice; among sixty-seven mice which survived the tar application for over a hundred days thirty-five developed tumors, of which one was a sarcoma, and sixteen were epitheliomata; two of these metastasized to the lungs.

When, after the war, these results became generally known, a great impetus was given to research. Leitch summarizes as follows the results of the last two years. If tar is applied repeatedly—say thrice weekly—to the skin of mice, the hair is lost, the skin becomes rough and scaly, and tiny warts appear in three to six months, which increase in size, and form excessively horny, upstanding papillomata with branching vascularized stalks of connective tissue. The malignant stage, when the epithelium grows down into the dermis and the cells become more atypical, is not generally apparent before six months at the earliest. Secondary growths will be found in the lymphatic glands or in the lungs. Sometimes there is no wart formation, only a minute ulcer, followed by subcutaneous induration. There is an apparent specificity of the irritant. So far, few have succeeded in experiments with rats; nobody has succeeded with guinea-pigs or rabbits, but almost all mice respond. Age has no influence. It is only a question of the length of time the irritant has worked.

Leitch tried stopping the application of tar as soon as minute warts had appeared and found that these continued to grow and became cancerous just as speedily as if the tar had been continued. He also found that if he stopped the irritant still earlier, before any new growth had appeared, in due course warts appeared and the phenomena of malignancy were unfolded just as before. Bang has had the same results. "We have grounds, therefore, for believing that in the case of human cancer, the antecedents of which are for the present hid from us, some irritant may have been in action and have disappeared, leaving no other evidence of its presence, long before the cancer declared itself."

Kennaway thinks the peculiar tumor-producing property of tar is to be found in greatest abundance in the higher boiling fractions, a fact which is confirmed by evidence from industrial tumors, such as the epitheliomatous ulceration of briquette makers. He found that tars of different sources vary greatly in this respect. Deelman of Amsterdam has discovered that if the tar applications are preceded four or five times by light scarification of the skin, the development of tumors is hastened. Another important contribution to the knowledge of tar cancer was made by Murray. He found that if he extirpated a tumor, either spontaneous or experimental, from a mouse and subjected that mouse afterwards to tar paintings, it did not show any response.

Leitch discusses chimney-sweeps' cancer, which is still probably as common as ever in England, with regard to the geographical distribution and the "exclusive localization to the scrotum." It is practically unknown on the Continent, and is rare in Scotland. Leitch believes that the soot from bituminous coal from the Midlands is the cause. As to the localization, the scrotum is no more exposed than other parts of the body, and he suggests that the cause may be the large sebaceous crypts of the scrotum, in which the soot lodges, the serum dissolving out the carcinogenic principle. It is impossible to produce it in animals probably because the necessary solvent is absent. Passey has induced epithelioma in mice by painting on their backs an ethereal extract of soot.

For fifty years it has been known that workmen exposed to the action of the crude products obtained by distillation of the oil-bearing shales of Scotland and of the brown coal (lignite) of Germany are prone to develop chronic skin affections, papilloma, and epithelioma, especially on the arms and sometimes on the scrotum. Leitch's experiments recently published showed that repeated applications of these oils to mice brought about the formation of tumors, usually simple papillomata appearing about three months after the onset of treatment, though some animals remained resistant even after nine months. Both carcinoma and sarcoma developed, the latter arising under a papilloma. They were slow to begin but their growth was extremely rapid. One of the successful agents was an

unfinished lubricating oil which nobody had suspected to be dangerous, but the experimental findings were confirmed by clinical evidence from Southam and Wilson who attribute to lubricating oils the scrotal cancer of mule-spinners in the Lancashire mills.

The carcinogenic properties of arsenic first proclaimed by Jonathan Hutchinson are defended by Leitch, who saw in a workman in an arsenic factory pigmentation, palmar keratoses, multiple papillomata and epitheliomata, all coincident, and learned from him that several fellow workmen had suffered in the same way. Leitch has had but one successful experiment—the production of a metastasizing epithelioma in a mouse by repeated applications of a weak solution of potassium arsenite. It is very hard to keep animals alive long enough while applying the arsenic in a concentration likely to be effective.

The epithelioma to which X-ray workers have been so liable is probably the clearest example we have in man of an irritation cancer. Marie, Clunet and Raulot-Lapointe are the only experimenters who claim to have produced a malignant growth in an animal by the application of X-rays, and in their single successful case, a rat, the growth was not epithelioma but sarcoma, developing on the site which had been treated nine times during five months. It did not appear till nearly a year after the treatment was stopped. Leitch does not dismiss this as a pure coincidence, for, in the first place, evidence seems to show that the rat's connective tissue is more responsive to the action of a carcinogenic substance than its skin, and the long delay after removal of the irritating agent fits in with Leitch's experiments with tar. As for the effect of radium, he has seen two cases of radium warts on the forefinger and thumb and has heard of three cases of epithelioma in radium workers occurring on the Continent.

The very widely held belief that tobacco smoking is one of the chief factors in cancer of the oral cavity could not be confirmed by Leitch who used both nicotine-free and nicotine-containing extracts on the skin of mice for many months. Loss of hair and chronic ulceration appeared, but no neoplasm.

An unexplained tumor, apparently industrial in origin, is the bladder tumor of dye-workers which occurs in men exposed to a large number of chemical compounds and sometimes in those who do not come in contact with any. It is suggested that such products as aniline, benzidine, and fuchsin, when inhaled or absorbed through the skin, undergo complex changes and are excreted in the urine in forms capable of inducing papillomatous growth in the epithelium of the bladder and, finally, carcinoma. No other tissue of the body responds in this way to the aniline derivative. It is definitely selective in its action; indeed, the kidneys and ureters, equally exposed to it, do not show tumor formation. The attempt to produce such tumors in mice by applications of aniline, benzidine, fuchsin, benzene, and xylene have failed.

A long series of negative experiments shows that there are only certain specific agents which have the property of eliciting neoplastic reactions. These substances, no matter how they differ, produce tumors of the same structure, namely, epithelioma or sarcoma. No one examining the final lesion could say what particular agent was used. It might be maintained from this that some single common cause must be postulated, but that does not follow, for acute or chronic inflammations similar in nature may be caused by very different bacteria.

Leitch recalls an illuminating experiment which he did several years ago. He had a transplantable mouse carcinoma, which had passed into a depressed phase; the percentage of successful inoculations was very low, and if tumors resulted they grew very slowly. He extracted the ground tumor with saline solution, injected it into a batch of mice, and inoculated them with living tumor tissues at the same time with a batch of untreated ones. In the control series there were few successful inoculations and the tumors grew slowly, but in those treated with the extract the percentage of successful inoculations rose from 30 to 80, and the rate of growth was rapid. Something had been supplied; a "growth aggression" which had been obtained from the same tumor tissue.

Leitch believes that cancer research is now at the stage which bacteriology reached fifty years ago, and expresses the hope that discoveries in this field will be as great, as rapid, and as epoch-making.—A. H.

EXPERIMENTAL TAR CANCER: A CRITICAL

REVIEW. *A. Gödel. Deutsch. med. Wchnschr., Oct. 5, 1923, vol. 49, pp. 1284-1285; Oct. 12, 1923, pp. 1315-1316.*

This is a very detailed review of the subject. Interested readers are referred to the preceding abstract of an article by Leitch which covers much the same work.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT AND PREVENTION

ANTHRAX IN ITALY. *Internat. Labour Rev., Nov., 1923, vol. 8, pp. 729-738.*

The prevalence of anthrax among animals and among human beings is stated in this article. Among animals of all sorts the disease has been declining in recent years; but no similar decline has occurred among human beings since 1915, although a decline of 65 per cent. occurred during the thirty years ending in 1916.

Year	Animals Died or Slaughtered for Anthrax					Cases among Human Beings
	Cattle	Sheep	Horses	Swine	Total	
1915	1,321	1,108	82	18	2,529	1,432
1917	1,339	25	44	2	1,411	1,208
1919	675	179	10	5	869	1,498
Percentage for 1919 on 1915 taken as 100	*51.1*	*16.2*	*12.2*	*27.8*	*34.4*	*104.6*

Anthrax among animals in Italy is most prevalent in districts where agriculture is extensive rather than intensive, and where stock is allowed to graze unwatched or only casually watched. Where more modern methods of agriculture are in use and the land has been drained, anthrax has almost entirely disappeared.

The total number of deaths from anthrax among human beings—221 in 1915 and 270 in 1917—is distinctly high compared with other countries; thus, in England and Wales with a much larger population, only twelve deaths (eight of which were of industrial origin) occurred in 1918, and eight deaths (six of industrial origin) in 1921. Agriculture claimed in Italy less than half of the total, leaving a substantial number to be distributed among other occupations. Information as to the occupations concerned is sparse and ancient. The thought is left that, although Italy has given us a curative serum, the problem of anthrax prevention has hardly yet been seriously tackled.—E. L. C.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

A HYPERKERATOSIS PECULIAR TO THE SIZERS OF THE FELT INDUSTRY. *M. Artom. Il Lavoro, Aug., 1923, vol. 14, pp. 225-230.*

Sizing is the process by which felt is rendered resistant, and consists of the application of pressure while the felt is wet with a 5 per cent. solution of sulphuric acid. For the finer hat felts this work is still done by hand. The hands of the men who spend their working hours pressing their palms slowly over the wet and rough material show a characteristic hyperkeratosis. Its appearance is first marked by a thick, amber colored palmar surface and by a large callus on the ball of the thumb. In severe cases the whole palm is covered with a horny stratum in which the fine lines are exaggerated and in which the usual lines resemble deep fissures. Each of the phalanges has three separate calluses, which may be fissured and from which scales may sometimes be detached. In some cases there is a true desquamation covering the whole palmar surface. The subcutaneous tissues are normal; when in treating deep cracks a callus is removed, the skin underneath appears barely reddened. Perspiration usually continues normal, but in a few cases there is a tendency to hyperhidrosis. Complications may develop from cracks which form along the deep fissures or from accumulations of pus under the calluses.

The author believes physical pressure to be the main cause of this industrial dermatitis. Cleanliness and the use of salves are the best

preventives. Wooden plates strapped to the hands have been tried as a means of keeping the hands drier but this has not been very helpful.—C. E.

CONTRIBUTION TO THE CLINICAL STUDY OF THE PROFESSIONAL DEAFNESS OF COPPERSMITHS. *F. D'Onofrio. Abstr. as follows from Arch. ital. di otol., rinol. e laringol., 1923, vol. 34, pp. 138-147, in Zentralbl. f. d. ges. Hyg., Nov. 25, 1923, vol. 5, p. 394.*

The deafness frequently observed in coppersmiths is confined to the series of tones from c ' ' '-c ' ' ' ' '. Complications often occur from functional disturbances of the middle ear, hereditary tuberculosis, severe malaria, and alcoholism. In some families there is a marked susceptibility of the ears to injury, even though there is no hereditary deafness; in such cases relatives who do not enter the coppersmith trade escape deafness. Deafness may be lessened in severity or retarded by periodic suspension of work (one month in every three or four), an arrangement which is frequently made possible by the present Italian labor situation.—C. E.

OCCUPATIONAL EYE DISTURBANCES. *C. Bakker. Abstr. as follows from Nederl. Tijdschr. v. Geneesk., Aug. 11, 1923, vol. 2, p. 576, in Jour. Am. Med. Assn., Nov. 24, 1923, vol. 81, p. 1829.*

Bakker's experiments apparently exculpated sulphuretted hydrogen as responsible for the superficial keratitis he describes. The smarting, photophobia and pain usually had subsided by the next day, but recurrences were frequent. He is inclined to incriminate the arsenic when ventilation is defective. Only the workers at the spinning machines were affected, and sometimes several were affected at once. The smoke and odor from frankincense strewed on live coals proved an effectual means for studying the air currents in the factory.—K. R. D.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

STUDY OF ACCIDENTS IN THE PORTLAND CEMENT INDUSTRY. *Safety Engin., Nov., 1923, vol. 46, pp. 234-236.*

The Portland Cement Association has published a bulletin on accident prevention which covers the experience of ninety-four plants for the year 1922. These ninety-four plants are called upon to classify and report every kind of accident in every department of the plant. The number of man-hours in each plant, the number of accidents for the last four years, the actual days lost, the actual days lost per 100,000 man-hours, the number of permanent disabilities, the number of fatalities, and the so-called "severity rating" are given for the years 1919, 1920, 1921, and 1922. The severity rating is an attempt to measure, in accordance with the scale of time loss for deaths and permanent disabilities advocated by the International Association of Industrial Accident Boards and Commissions and by the United States Bureau of Labor Statistics, the various degrees of disability in terms of permanent total disability.

The number of days lost per 100,000 man-hours in 1922 varied among the ninety-four plants from 3.3 days to 110.8 days. The total number of fatal accidents in the ninety-four plants in 1922 was 52; the total number of permanent disabilities, 53. The total number of accidents was 2,649 and the total number of days lost was 42,844, or an average of 6.2 days per accident. Of all accidents, 50.4 per cent. caused the loss of one to seven days; 18.4 per cent., the loss of eight to fourteen days; and 29.2 per cent., the loss of fifteen or more days. Two per cent. of the accidents were fatal.—M. F. M.

SAFETY STANDARDS OF THE INDUSTRIAL BOARD: TUNNEL CONSTRUCTION AND WORK IN COMPRESSED AIR. *Pennsylvania Department of Labor and Industry, vol. 1, No. 2, pp. 76 and index.*

A 76-page booklet, with index, of which several pages, notably 52 to 58, are directly concerned with regulations on hours of labor under air pressures up to 50 pounds per square inch, decompression, ventilation, medical attendance, air locks, etc.

In tunnel ventilation 75 cubic feet of air per man per minute is required. Where horses or mules are used 175 cubic feet per minute is required per horse or mule. After

blasting, the ventilating system must be able to remove entirely the contaminated air in fifteen minutes and be capable of removing 4,000 cubic feet of air per minute.—P. D.

THE SAFE HANDLING OF SOLVENTS. *A. G. Smith. Travelers Standard, Nov., 1923, vol. 11, pp. 225-230.*

There is a tendency in the rubber industry toward the development of processes that avoid the use of solvents in large quantities, or that utilize solvents that are less inflammable than those formerly favored. Advances have also been made in the way of providing improved storage facilities and good ventilation, isolating the buildings where considerable quantities of solvents must be used, installing solvent-recovery systems and educating employees with respect to the dangers associated with solvents.

This article discusses the characteristics of certain special solvents from the point of view of explosion and toxic action hazards, hazards of storage, and means of preventing the accumulation of static electricity.—M. F. M.

HOW TO ORGANIZE FOR SAFETY IN A WOODWORKING PLANT. *J. L. Thompson. Travelers Standard, Nov., 1923, vol. 11, pp. 217-224.*

A safety organization in a woodworking plant is not essentially different from similar organizations in other plants. The basic principles of safety work are: that it must be established on an organized basis; that it must enlist the co-operation of executives and workmen; that it must be in charge of a man who has not only mechanical ability but also the gift of getting along with other men; and that it must be followed up continuously and consistently.—M. F. M.

HEAT, COLD AND HUMIDITY

EFFECT OF DIFFERENT TEMPERATURES AND HUMIDITIES ON RESISTANCE OF RATS TO PNEUMOCOCCUS INFECTION. *C. McDowell. Abstr. as follows from Am. Jour. Hyg., Sept., 1923, vol. 3, p. 521, in Jour. Am. Med Assn., Dec. 8, 1923, vol. 81, p. 1981.*

McDowell found that rats exposed for two weeks to a high temperature (83° F.) combined with a relative humidity between 44 and 72 per cent. are more resistant to an intraperitoneal injection of pneumococcus than are rats kept at medium temperatures. Compared with this optimum condition, high and probably low humidity and medium temperature are unfavorable conditions. Animals accustomed to a medium temperature (67-71° F.) showed a lowered resistance when changed to a high temperature (83° F.) immediately after a pneumococcus injection.—K. R. D.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

DAYLIGHTING. *L. E. Cofer. Indust. Bull., Nov., 1923, vol. 3, pp. 33-34.*

The amount of light received through a window by the area illuminated is proportional to the extent of sky area which can be seen from the included space. Sash bars, wire screens, translucent glass, and dust reduce the illumination intensity to a marked degree. White ceilings, walls, posts and columns act as a secondary source of a light system and aid in reflecting and distributing the light. The possibility of substituting skylights for additional artificial lights should be considered by those who desire increased illumination.—M. F. M.

THE RELATION OF ILLUMINATION TO PRODUCTION. *D. P. Hess and W. Harrison. Tr. Illuminating Engin. Soc., Nov., 1923, vol. 18, pp. 787-800.*

"This paper is a report of extensive tests on the time required for the inspection of parts of roller bearings under various levels of illumination from 5 to 20 foot-candles. Over 7,000,000 separate pieces of material were inspected during the test period. The

types of lighting employed as well as the illumination levels were found to have an important bearing on the output of the department. Cost data on the lighting and the value of increased production are included in the paper."

In a series of well-prepared charts, increased production is shown to vary with illumination intensity as follows:

Foot-Candles	*Percentage Increase in Production*
20.0	12.5
13.0	8.0
6.0	4.0
5.0 (old system)	0.0

The test was begun in the middle of February and carried through the 25th of April so that it was impossible to return to the original 5 foot-candle standard because of the advancing season and resultingly stronger daylight. It was noticed in going from the 6 foot-candle standard to the 20, or *vice versa,* that production returned but slowly to approximately the original figure, showing that the habits of faster or slower work are not resumed until a certain period has elapsed in which the subject has had time to become accustomed to the change. All changes in illumination were made without announcement to the workers.—P. D.

LIGHTING THE SILK INDUSTRY WITH INCANDESCENT LAMPS. *H. W. Desaix. Tr. Illuminating Engin. Soc., Sept., 1923, vol. 18, pp. 679-686.*

"This paper is based on observations, investigations and experiments conducted by the author to secure for the Silk Industry a practical system of illumination to replace the present inadequate and impractical methods.

"Each process in the manufacture of silk fabrics presents a problem in itself and each has been so treated."

A survey of various silk weaving plants showed that some were using 50 or 60-watt Mazda lamps, but in the majority of cases tin cone or flat shaped painted reflectors were in use.

In weaving rooms 200-watt, type "C", clear Mazda lamps in rugged prismatic glass reflectors were installed to give 30 foot-candles on the "warp" tapering off to 15 foot-candles on the aisles and drives. In the winding and quilling rooms an average of 8 to 12 foot-candles was obtained by adjusting the spacing between 200-watt Mazda C lamps in RLM dome steel reflectors. In warping, intensities of 30 foot-candles on the work is advised with 12 to 15 foot-candles for Swiss warping. In "throwing," an intensity of approximately 10 foot-candles is recommended. In dyeing, 12 foot-candles was found to be sufficient while provision is made for artificial daylight for the matching of colors.—P. D.

ARTIFICIAL ILLUMINATION IN THE IRON AND STEEL INDUSTRY. *W. H. Rademacher. Tr. Illuminating Engin. Soc., Nov., 1923, vol. 18, pp. 824-845.*

"In this paper the requirements of the various sections and operations (of iron and steel mills) are treated in detail, recommendations being offered as to the best practice. Photographs illustrating the application of the modern principles discussed accompany the text."

For purposes of illumination study, the various processes are classified as (1) rough, (2) medium rough, (3) medium, or (4) fine, according to the type of work carried out.

A table (p. 835) gives comparative foot-candle intensities between the old (1911), modern (1923), and newly recommended intensities. The new intensities offer a substantial increase over the old and, in most cases, over the modern. For rough work, 0.1 to 4 foot-candles are recommended; for medium rough, 1 to 6 foot-candles; for medium, 4 to 8 foot-candles; and for fine, 8 to 15 foot-candles, the exact figures varying with the work.

A problem with which the author had to contend was the amount of dust and smoke present in many of the processes and the consequent lowering in lighting intensities. In most cases RLM enameled steel dome reflectors with 200, 300, 500, and 750 watt Mazda C lamps were used.

The cost of the new system in terms of output of the processes is computed.—P. D.

VENTILATION OF DEPARTMENT STORES. *A. M. Feldman. Nation's Health, Nov., 1923, vol. 5, pp. 784-785.*

The ventilation system described by the author is designed to improve the conditions prevalent on the ground floor and in the basement of large department stores. The system eliminates cold drafts by doing away with the outer vestibule doors and by delivering more air throughout the first floor than is taken out by the exhaust fan. The excess air has to escape through the entrance doors and cold air is effectually kept out. The fresh air fan is of a capacity to deliver a maximum of 100,000 cubic feet of air per minute. During the winter months sufficient air is delivered without causing drafts if the fan is run at 70 per cent. of its maximum speed. In summer it is kept running at full speed, which insures a pleasant circulation of cool air.—C. E.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

HEALTH PROBLEMS IN INDUSTRY. *N. J. Ardan. Indust. Doctor, Nov., 1923, vol. 1, pp. 183-186.*

Most industries have not deemed it worth while to develop for their workers a home and community health program commensurate with their plant activities. The majority of the defects discovered in the re-examination of employees, however, are directly traceable to faulty home and community environments and to lack of education, while only a minority of defects appear to be due to occupational hazards. Until industry concerns itself with home and community health hazards, the responsibility of solving health problems outside the plant rests with the industrial or public health nurse.—M. F. M.

PRACTICAL HYGIENE AND SANITATION IN THE DENNISON MANUFACTURING CO. *H. G. Murray. Nation's Health, Nov., 1923, vol. 5, pp. 809-811.*

A description of the hygienic work, including medical care, education, eye conservation, and sanitation, which is being done by the health departments of Dennison Manufacturing Company. Two interesting features of the educational department's activities are the nutrition class for girls who are convalescing or are more than 10 pounds under weight, and the posture training given in the Training Division or School of the factory. All new employees' eyes are examined and if their vision is defective, corrective lenses are placed in a trial frame to show how much improved their vision might be. Employees doing certain kinds of work are required to have suitable glasses within two weeks after employment.—C. E.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

WAGES AND HOURS OF LABOR IN THE AUTOMOBILE INDUSTRY, 1922. *U. S. Bur. Labor Statistics, Bull. 348, Oct., 1923, pp. 70.*

This report covers 54,930 male wage-earners and 1,379 female wage-earners working in forty-nine representative establishments in Michigan, Ohio, New York, Indiana, Pennsylvania, Wisconsin, and Illinois. The tables show earnings per hour, full-time or customary hours of labor per week, hours and days actually worked, and earnings actually received in the representative pay period, by occupation, sex, and state. The average number of full-time hours for males per week was 50.1, for females, 50.3. The average full-time earnings per week was $33.19 for males and $22.05 for females.—M. F. M.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

THE SOCIAL AND GEOGRAPHICAL DISTRIBUTION OF INTELLIGENCE IN NORTHUMBERLAND. *J. F. Duff and G. H. Thomson. Brit. Jour. Psychol., 1923, vol. 14, pp. 192-198.*

On a certain day an intelligence test was taken by all the children (aged 11 to 13) attending elementary schools in Northumberland and by most of the secondary school pupils between these ages. The 6,695 girls and 6,930 boys involved were grouped under eight

classes, according to their intelligence quotient. The occupation of each child's father was ascertained, and these occupations were grouped in order to show differences of social standing, skill, and responsibility. The results obtained are given in detail, but as many of the groups were quite small, they were regrouped according to occupations of similar standing. Children of professional classes came first, with an average intelligence quotient of 112.2. Children of the higher commercial class had one of 109.3; of the shopkeeping class, 105.0; of engineers, 102.9; of foremen, 102.7; of men in building trades, 102.0; of metal workers, 100.9; of miners (chiefly coal) and quarrymen, 97.6; of agriculturists, 97.6; and of laborers, and other low grade workers, 96.0. If all the parents were divided into "brain workers" and "hand workers," children of the former had an intelligence quotient of 106.6, and of the latter, 98.6.—H. M. V.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Decisions of Courts and Opinions Affecting Labor, 1922. *U. S. Bur. Labor Statistics, Bull. 344, Sept., 1923, pp. 412 and index.*

This bulletin is a collection of representative cases taken, for the most part, from state courts of last resort and federal courts. The material is abridged and the statements of facts are in the language of the editors.

Critical Study of the Law Relating to Industrial Diseases. *V. Balthazard and R. Piédelièvre. Abstr. as follows from Ann. de méd. lég., 1923, vol. 3, pp. 272-293, in Deutsch. Ztschr. f. d. ges. ger. Méd., 1923, vol. 3, p. 101.*

The law of October 25, 1919, which has been in force since January 27, 1921, extends the accident insurance law to include lead poisoning and mercurial poisoning. In order to be entitled to compensation, the worker must be taken ill in the way characteristic of the disease, and he must be employed in one of the occupations specified. Claim for compensation expires one year after the worker has left such employment. A description is given of the method of calculating the amount of compensation (on the basis of one-half day's work) which the employer must pay. The law contains a list of compensable diseases (lead encephalopathy and arteriosclerosis are not included under lead poisoning) and of occupations concerned.

The authors emphasize the superiority of the French law over the Swiss law, under which the worker must prove that the poisoning is the sole cause of his illness. As a result of this requirement communities often have to bear the burden of expenses which industry ought to bear. A list of thirty-four cases (thirty-three of lead poisoning and one of mercurial poisoning) upon which judgment has been passed on the basis of the law concludes the study.—M. C. S.

Industrial Medicine in its Relation to Workmen's Compensation. *L. W. Hatch. Indust. Doctor, Dec., 1923, vol. 1, pp. 208-212.*

The establishment of workmen's compensation has imposed new obligations on the medical profession, particularly those of furnishing technical information as to the nature and extent of injuries for which compensation is claimed and of maintaining satisfactory industrial relations between employer and employee. It has also given rise to many new problems, such as the question of free choice of physician, "lifting" of cases, fee schedules, and the practice of specializing in compensation work.

The chief difference in the situation of the industrial physician and the general practitioner under workmen's compensation laws lies in the much closer relationship between the physician and the employer or insurance carrier. The industrial physician can be depended upon to recognize the identity of interest of employer and employee in providing the best treatment possible for the latter when injured. Likewise in the matter of reports, the industrial physician profits by the exigencies of his own work.

Workmen's Compensation Tables. *New York State Dept. Labor, Special Bull. 120, Sept., 1923, pp. 55.*

This bulletin is a collection of tables for determining the present value of New York State compensation cases.

REHABILITATION OF DISABLED EMPLOYEES

THE AFTER-EFFECTS OF CERTAIN INDUSTRIAL INJURIES, AND THEIR TREATMENT BY X-RAYS. *R. A. Morrell. Brit. Med. Jour., Sept. 15, 1923, vol. 2, pp. 460-461.*

Certain forms of industrial injury often result in limitation of function owing to the formation of an excessive amount of fibrous tissue during the process of repair. Examples of such injuries are those involving the tendons of the wrist or fingers after either primary or secondary suture; extensive lacerated wounds or burns of muscle, and even the less serious condition of tenosynovitis. The usual course of treatment of such cases—a prolonged period of after-treatment in the massage and electrical department—involves a serious economic factor, for during this period the patient is paid compensation and too often the results of treatment are not satisfactory. The object of this paper is to urge the claims of radiotherapy in such cases. Cases are cited.—M. F. M.

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OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

CASE OF TRADE ARGYRIA. *H. G. Adamson. Proc. Roy. Soc. Med., Dec., 1923, vol. 17, Section of Dermatology, p. 8.*

"This patient has for many years been occupied in making nitrate of silver. The pigmentation seems to be confined to the parts about the mouth and is particularly marked in the nasolabial furrows. Similar discolorations of the conjunctivae are, I believe, known to ophthalmologists as the result of local applications of silver nitrate. It appears that the silver is deposited in the subepithelial margin and not in the epithelium, which explains the fact that it is never exfoliated but remains permanent. In trade argyria the silver particles are said to be deposited directly in the skin and to form small masses sometimes as large as a hemp seed. In this case the infiltration is more uniform and I am not prepared to say exactly in what way it has reached its destination. The patient states that the skin of the hands and face becomes splashed with nitrate and darkened (by exposure to light). This wears off, but leaves the skin around the mouth pigmented, but not, as we see, the skin of the hands."

VISUAL ACUITY IN INDUSTRIAL CASES. *L. H. Weinheimer. Indust. Doctor, Dec., 1923, vol. 1, p. 203.*

The author believes that a workman who receives an injury to his eye should be treated as a private patient. An accurate refraction should be done with and without drops, and proper glasses should be prescribed. This will conserve the vision of the injured workman as much as possible and at the same time may save the employer expensive compensation charges. A careful routine examination will also enable the examiner to detect deliberate malingering.—M. F. M.

PREVENTING EYE WASTAGE IN INDUSTRY. *L. M. Francis. Nat. Safety News, Dec., 1923, vol. 8, pp. 27-28.*

Eye wastage in industry may be reduced by tests of vision to prevent accidents resulting from the employment of workers at jobs for which they have not sufficient vision and by proper care of injuries, particularly of minor injuries of the cornea, which are often neglected.—M. F. M.

BONE-FREE RADIOGRAPHS: AN ADVANCE IN

THE PHOTOGRAPHY OF SMALL FRAGMENTS IN THE EYE. *T. H. Butler. Proc. Roy. Soc. Med., Jan., 1924, vol. 17, Section of Ophthalmology, p. 6.*

It is difficult to get reliable radiograms of small metallic fragments in the interior of the eye and practically impossible to detect pieces of glass or stone because the rays have to pass through the skull bones when the picture is taken in the ordinary way. Many years ago Sir James MacKenzie Davidson and others obtained bone-free photographs, but their method was not taken up and was apparently forgotten. Professor Vogt, of Zürich, has resuscitated and elaborated the procedure, and by means of his method it is both possible and easy to obtain a clear picture of the smallest metallic fragment of bone, stone and lead-free glass, if situated in the anterior part of the eye.

The procedure is simple. An oval dental plate is pressed in between the eye and the internal margin of the orbit as far as the patient will permit without too much discomfort. The tube is located laterally on the outer side and somewhat behind. An exposure of three seconds with a soft tube is sufficient. A second exposure is made with another plate that is inserted above the eye, the tube being below. For this purpose the patient is allowed to hang his head down over the edge of the table and the tube is brought above him.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

DOES SAFETY WORK IN THE TEXTILE PLANT PAY? *H. Saul. Nat. Safety News, Jan., 1924, vol. 9, pp. 21-22.*

The author of this paper believes that intelligently directed safety work resulting in the reduction of accidents does pay. Since unprofitable employees are not retained by employers, the absence of an employee from work because of injury represents a financial loss. In the six plants of the United States Finishing Company, 76 per cent. of the accidents are due to non-mechanical causes and could be avoided if workmen were careful.—M. F. M.

SAFETY STANDARDS IN G-E PLANTS. *G. E. Wallis. Nat. Safety News, Jan., 1924, vol. 9, pp. 9-12.*

The safety problems of the General Electric Company are in the hands of a general committee on safety and sanitation. This committee is a clearing house on safety matters, and by means of exhaustive investigations has formulated important and valuable basic safety standards for the guidance of all plant executives and safety men. Each member of the general committee is chairman of the safety committee of his plant. The large plants have general and departmental committees, while the small ones have one main committee.

To stimulate interest in safety as promulgated through this organization of workers, factory sections with the lowest percentage of lost time due to accidents each month are awarded $15 for each mutual benefit section within their jurisdiction. Discharge for disregard of safety regulations concerning the operation of machines with no mechanical guards at the point of operation has established the fact that such regulations are to be taken seriously.

The general committee has given a great deal of attention to mechanical safeguards, proper illumination, and standardization of electrical equipment as means of preventing accidents.—M. F. M.

CONSTRUCTION OF MACHINERY GUARDS. *Nat. Safety News, Jan., 1924, vol. 9, pp. 43-53.*

This is No. 58 of the Series of Safe Practices Pamphlets. It considers such matters as materials suitable for guard construction, machine tools needed for fabrication of guards, detailed guard features, specifications for guards, and guard standards.—M. F. M.

SUBJECT INDEX TO VOLUME V

This is a subject index to all the reading matter in the ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE, and one should, therefore, look for the subject word. The name of the author follows the subject entry in parentheses.

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